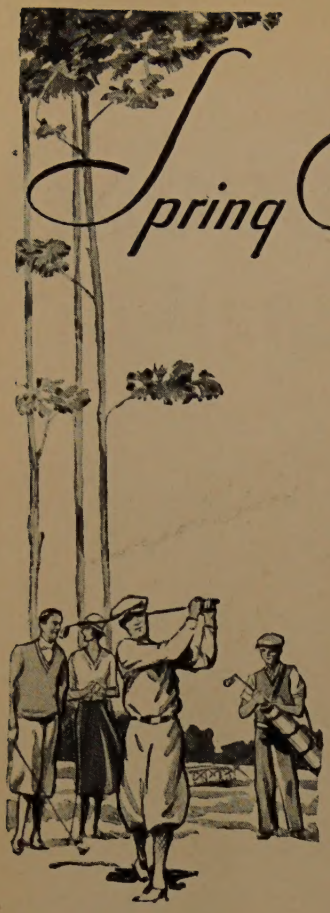
NATURE MAGAZINE

MAY 1934 35¢ VOL. 23, NO. 5



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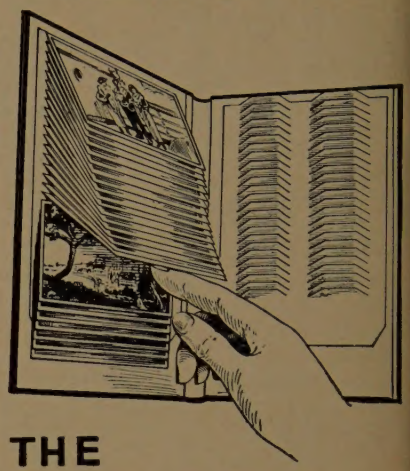

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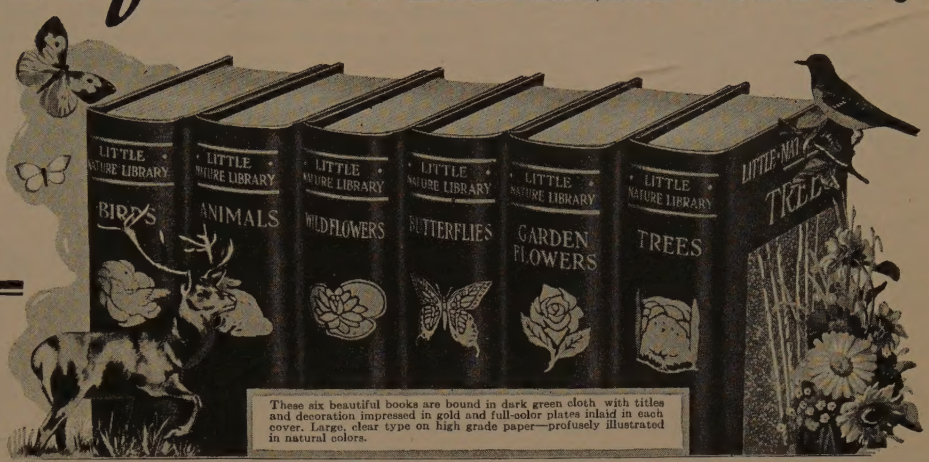

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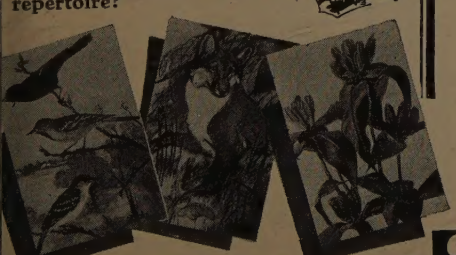

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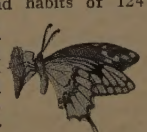

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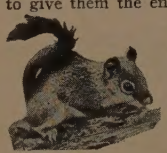

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NATURE BY THE SEA

By FREDERIC B. LITTLEFIELD
DIRECTOR, ROBIN HOOD

Nature study is often erroneously associated with pedantic butterfly chasers, maidenly school teachers and epicene fellows of science. Helping to prove that this popular supposition is false, nearly seventy-five per cent of our campers elect the study each season. Live active boys, red-blooded and full of excess energy, actually select Nature without undue influence or suasion. You may wonder why youngsters who are physically perfect, good ball players, excellent swimmers, expert sailors, can like any activity as passive as Nature. There is, however, a good reason. The same urge that sends a boy to camp, the reason why men travel, that pioneers explore unknown lands, may be incorporated in Nature study. Adventure, the opportunity to show skill, the chance to create, the reward of personal satisfaction or group glory, are driving forces in most interests. Nature study is no exception.

We are especially blessed at our camp with opportunities for studying fauna and flora common to a lake, the highlands and the sea. To watch a group of boys excitedly explore an ocean pool left by the receding tide is a delight. To the uninitiated, it is merely a bit of ordinary water caught in a rock crevice but to the boys it teems with life, interest and fun. This interest is something real, something enduring, lasting, and may, when baseball days are past, offer an activity for useful leisure time. If present-day political tendencies continue, education must be prepared to fit our children for the aggrandizement of leisure. As so often pointed out, tritely but with truth, the present generation of children expect entertainment without mentally working themselves. Nature study provides, if not a general panacea, at least an outlet.

One project of our Nature group is to build an aquarium for salt water specimens. Of course the fun of collecting and the chance to create are a part of the activity. Kelp, seaweeds, barnacles, small fishes, sea urchins, crustaceans, starfish and beautiful sea anemones, whose gorgeous colors and delicate fascinating tentacles attract and mystify, fill the aquarium. The moving spines of the sea urchins, the peculiar tube feet of the starfishes, the various types of seaweeds are all of interest, even to small boys. In addition, our Nature counselor, a man with unusual ability, has provided written descriptions of the specimens collected and it is surprising to watch boys, who ostensibly have stopped by to watch the movements of these common sea creatures, become interested in a more complete study of them.

Walks along the beaches to observe some particular phase of tidal life are popular. The younger lads delight in searching for the familiar clam, whose tell-tale fountain identifies it to the boys as they stroll the low water marks.

The geology of the coast is plainly outlined on the rocky sections of the shore line and veins of quartz and ore protrude to tell stories to the esoteric. The volcanic origin

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of many of the islands of Penobscot Bay are contrasted to the metamorphic shore line of the mainland. Here there is excellent opportunity for the amateur to gain a fundamental knowledge of rock lore.

A very important Nature activity is a trip to barren islands where seals play from the cliffs and boulders, and marine life is undisturbed and abundant. The nesting habits of sea birds, the terns, sea gulls, sandpipers and ospreys are studied with zeal and explorations to an island rookery where hundreds of terns nest are a thrill for youngsters. Penobscot Bay is a sheltered inland sea where monsters of the deep sometimes venture in search of herring and other small fry. Porpoises and blackfish are common sights and last summer a whale played about the camp schooner near enough for us to watch the huge mammal and to recall "Moby Dick" and "Thar She Blows."

Thus the Nature study of the land, supplemented by the Nature study of the sea, can and does create an interest for young boys.

"Ding" Appointed

Jay N. Darling of Des Moines, Iowa, better known to millions as "Ding", one of the leading cartoonists in the world, has been appointed Chief of the United States Bureau of Biological Survey. He succeeds Paul G. Redington, who has returned to the United States Forest Service, in which branch he served with distinction for many years until he was drafted to head the Survey.

Mr. Darling's attainments are not confined to the drawing board. Those who follow his cartoons cannot fail to have vivid recollections of many telling picture stories directed at those who ruthlessly destroy wild life. Mr. Darling's interest in wild life has never been academic or merely as grist for his powerful pen. He has long been an ardent conservationist. Most recently he has served as a member of the President's Committee on Wild Life Restoration. He is also a member of the Advisory Board, Migratory Bird Treaty Act, and of the Iowa Fish and Game Commission.

The Oil Menace

"If the 'Oil Menace' is ever to be stopped or decreased, it is essential to get the cooperation of other countries," declares a recent issue of the Bird Lovers' League Magazine of England. "No single country can protect itself from this great and horrible destroyer of sea birds and fish, as the refuse oil which is discharged from ships drifts for hundreds of miles.

"It is hoped that the subject may be considered by the League of Nations, but meanwhile we should like to ask our members all over the world to let no opportunity go by to promote that necessary cooperation. Could not the United States Audubon Societies and all the members of the B.L.L. in the U.S.A. approach President Roosevelt on the subject? We have heard that he is a bird-lover, and surely if England and America made a combined effort, something could be done to check this ever-increasing 'black death' to birds."

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MR. BUSHY TAIL

By R. NELSON

Hearing a commotion in my back yard, I opened the door just in time to save Mr. Bushy Tail, who, seeking protection, crouched, terrified, in the corner of the shed, while outside, half a dozen hoodlums clamored for his life. Although this happened several weeks ago, he still seems content to stay, and I'm so used to him now that every morning I look for him, and usually find him sitting most anywhere with a lugubrious look on his face that seems to say, "When do we eat, Mister?" But to make his picture became a problem. The sight of a camera sent him scurrying to the treetops.

One day, when I saw him at his favorite haunt consisting of a few pieces of square timber on which he played all day, I determined to try again. Of course he would pick the worst place in the world for picture making; in the heavy shade of a tree, made contrasty by patches of sun light filtering through the branches. Scattering some bread around, I didn't have long to wait before seeing him on the ground glass of my reflecting camera, and watching him as he nibbled daintily, I made an exposure, then he was off to some secret cache. In a few moments he was back again, and although I made many "shots", I was hardly satisfied. But at last he sat just where I wanted him to—with the sun acting as a huge spotlight, lighting up his tail, his whiskers, and the tips of his tiny ears, creating what lighting experts would probably call "line lighting", and by pressing the antinous release, I got the negative from which the enlargement was made. In closing, I wish to add that although I was using a small camera with the subject very small on the original negative, the ten diameter enlargement remains sharp and clear, which certainly makes me a booster for the miniature camera.

ORIGINAL PHOTOGRAPH TAKEN WITH A MINIATURE CAMERA BUT NEGATIVE ENLARGES TO FIVE AND ONE-HALF BY SEVEN WITH NO LOSS OF DETAIL

A SUGGESTED IMPROVEMENT FOR FILM PACKS

By L. V. JOLLIFFE

In using film packs of the larger sizes one is often disappointed in the results obtained because of a part of the image being out of focus. This trouble is a result of a slight bulging of the films in the pack, or in cameras using focal plane shutters, may be caused by a movement back and forth of the film due to the suction caused by the passage of the roller blind past the film. In film packs as large or larger than four by five inches the trouble is often entirely disastrous to the negative, rendering it useless.

With the author—using film packs four by five, and enlarging to eight by ten, or, larger prints—it was a question of either finding a solution or dispensing with film packs entirely and using only cut films, which are heavier and do not bulge when used in sheaths.

A thin clear piece of glass was cut to exactly fit into the face of the film pack adapter and was glued into it in such a position that the face of the film pack was flat against it when placed in its usual position in the adapter. The topmost film is, therefore, held flat against the glass and cannot possibly be affected by the shutter nor bulge. The picture is taken through the glass and the pack is used in the usual manner.

Before the glass is glued in position its edges should be carefully ground smooth on an oil stone to prevent the possibility of the films being scratched as they are changed.

The results are all that could be hoped for and the largest stops can be used with the assurance that the focus will be as seen on the ground glass.

HOME ENLARGER AIDS SMALL CAMERA USER

A British photographic publication comments on the pronounced trend toward enlargements in the favor of amateur photographers. Aware of that trend, the Eastman Kodak Company has developed, and is currently announcing, a simple enlarging apparatus for the home use of picture-takers.

The Kodak Home Enlarger is described as the simplest enlarger offered for amateur use and yet as entirely competent to do the work required of it.

The new apparatus takes negatives from half the size of a Vest Pocket image up to and including 3¼ by 4¼ inches and 9 by 12 centimeters. A 3¼ by 5½ negative is accommodated by the holder, but only 4½ inches of its length can be enlarged.

Enlargements up to 11 by 14 inches can be made: up to 5 by 7 from negatives of the half Vest Pocket size and proportionate enlargements from larger-sized negatives. Prints the size of the negative may also be made in the enlarger.

The easel measures 11½ by 14½ inches and has metal clips to hold the paper. The lens is a Kodar, 98-millimeter—one that assures good definition and even illumination of the entire field. An ordinary 60-watt lamp is the source of illumination.

The camera and its stand move in a groove to adjust the image to the desired enlargement size. Moving the lens support in a second groove gives sharp focus. A circular ground glass set in the surface of the easel makes sharp focusing possible by viewing from behind the easel. With the easel folded down and the camera pushed forward, the Kodak Home Enlarger stows in small space. P. M. C. Bromide, a paper with speed and with a variety of surfaces and degrees of contrast, is recommended by the Eastman Kodak Company for use with the enlarger.

FOR MOVIE MAKERS

If there is anything of importance to the amateur maker of motion pictures that William J. Shannon has overlooked in his book *Movie Making Made Easy* it is difficult to discover it. Here is a handbook for the amateur who seeks to get the best out of his home motion picture equipment, and if he cannot achieve this goal with the help of this book he might as well give his camera away and take up knitting.

The field of the amateur movie maker is growing. There are, according to estimate, some three hundred thousand home movie cameras and about four hundred thousand projectors. Industry and the schools are adding this equipment, and visual education is increasing in popularity. This development offers a possible market for the better films of amateurs. Many an advertising sales talk can be made more effectively with the aid of a small projector and a couple of reels of sales film. Here again the amateur may be able to produce films and market them just as does the amateur user of the still camera.

So, in preparing his book, Mr. Shannon has canvassed all phases of the amateur ciné work, from the selection of the camera to sound and color movies. There are chapters on trick photography, making animated cartoons, making up for the camera, writing the scenario, title making and other important subjects. In other words, it is a complete and valuable book based on long experience.

The publishers are Moorfield and Shannon, 66 Elm Place, Nutley, New Jersey. Copies sell for two dollars, postpaid.

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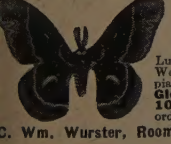

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4-H Club Conservation

Forty thousand active, eager recruits will be rallied to the cause of conservation in Minnesota this year through the inauguration of a new 4-H Club project in the conservation of wild life. Interest will be kept at high pitch by $1,000 worth of scholarships and educational trips made possible by private donation.

This 4-H program of conservation will be as broad as the skies, each club group or individual being allowed to undertake whatever phase of conservation or wild life improvement it chooses. The tremendous impetus to the conservation movement which should result from this appeal to the young people will be evident to everyone familiar with the scope and influence of 4-H Club work, generally, and in Minnesota particularly, this state having one of the largest 4-H enrollments and ranking among the foremost in the quality and effectiveness of its program.

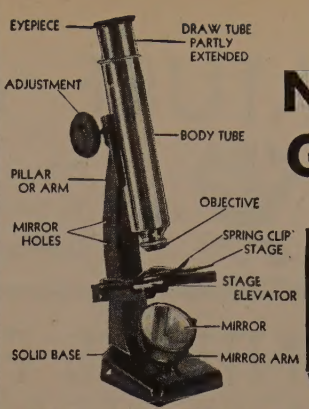
From the educational standpoint alone, the effect of this project will be most far-reaching. Township and community 4-H groups throughout the state will be encouraged to stress wild life and conservation studies on the programs of their monthly meetings. A study of the wild flowers and trees, and of the need for the conservation of wild animals and birds, as well as control of the predatory types can be made to serve as excellent material for 4-H Club programs, says T. A. Erickson, state 4-H leader.

Each club will also be encouraged to carry on active group projects, such as community campaigns for obeying game laws, cooperation with local game officials, the making of community wild life surveys, the study of fire prevention and elimination of fire hazards and planting to increase game cover.

Each club will also be encouraged to urge its members to take individual conservation projects, among which are suggested: getting acquainted with and protecting some kind of seasonal bird or animal, winter feeding of game, collecting eggs and raising and liberating native game birds, studying and giving correct information about birds or animals considered harmful but which are really helpful, the development of muskrat refuges, saving nests of pheasants, grouse and quail when cutting alfalfa or hay, fire prevention, the study of game laws, planting material desirable for cover and food, protection of game and song birds from house cats, construction of bird houses, protection of fish and rescue work, and many other projects.

Weather Data

The weather is ever a fascinating subject and NATURE MAGAZINE has long featured articles on weather and other related physical phenomena. The most interesting popular publication devoted entirely to this subject is the quarterly brought out by the Taylor Instrument Companies, Rochester, New York. This always interesting and attractively produced publication is available at twenty-five cents a copy, or a dollar a year. Officials of schools, colleges or libraries may, however, receive it regularly on application made on official stationery.



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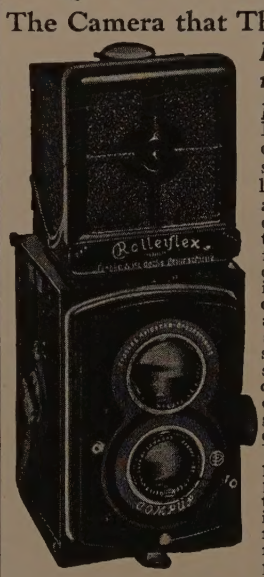

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LOVE 'EM AND LEAVE 'EM

• • •

A PLEA IN BEHALF OF OUR WILD FLOWERS

• • •

WE WONDER how often most of us stop to consider that our true love of Nature may be accurately gauged by the consideration we show it. When we see the hosts of people, many of whom, we think, genuinely believe themselves to be Nature lovers, returning from the country in automobiles gay with dogwood or redbud, wild honeysuckle or laurel, we find ourselves reflecting, rather sadly, that if this is the manifestation of a love of Nature certainly Nature would be better off with less of it. One instantly rejects this conclusion as wrong somehow. We all know that love makes the world go round, so quite obviously we should not strive for less of it. Where, then, is the discrepancy?

That brings us right down to a consideration of the meaning of love. What is it, anyway? The dictionary says "a strong feeling of affection." That is all right, as far as it goes, but it does not go far enough. Anyway, what true lover is content to love by the rules set forth in the dictionary? So let us look into the inadequacy of this definition a bit further. The weak point seems to be the fact that affection, however strong, may be selfish while love is never that. Rather, love seeks humbly for an ever-deepening understanding and appreciation of its object and strives always to serve and cherish. Measured by such a gauge how many of us are real Nature lovers?

One of the surest proofs of that hidden spark of divinity in human nature is our yearning for beauty. But like children we reach out eager hands for some frail bit of loveliness and find it ruined in our grasp. We learn, slowly, that if we take it home in our hearts it can be ours forever.

Nature is lavish and its fields and woods are rich with many floral treasures that are so adaptable in their requirements for growth and so prolific that we may joyously take them home with us without noticeably lessening their numbers. However, we become so used to the many miracles about us every day that we are apt, in an almost unconscious search for novelty, to pass these common flowers by as if they were of no account. Violets bloom by the roadside, but because theirs is a familiar loveliness we frequently seek further for rarer blossoms and bring home orchids from some distant woodland.

We build great art galleries where man's masterpieces are guarded with the most jealous care. Nature's masterpieces, bits of loveliness that the greatest human genius cannot create, we frequently carelessly destroy. When we stop to realize that these dim woodland glades—"man's first temples"—are really holy places we will not be so hasty about despoiling them. Surely the beauty and the hush here proclaim the immediate presence of the Great Spirit. The true Nature lover stands awed at the miracle of life as manifested in the frailest and most exquisite wildflower.

Man's progress leaves a trail of desolation across the face of Nature. It is inevitable that the ever increasing needs of modern life should present an equally increasing menace to our wildflowers. Now, as never before, true Nature lovers must strive to protect what is left. The most basic need of all seems to be a more intelligent love, an ever-deepening realization of just how much they mean to us and of what we must do to protect them. True love always has laughed at difficulties and worked miracles and always will. It can preserve to us our wild flowers. So let's love 'em and leave 'em.

"BENEATH THE BARN FLOOR A FAMILY
OF SKUNKS HAD ITS DEN"

NATURE MAGAZINE
VOLUME 23 MAY · 1934 NUMBER 5

EVENING BELLS

BY E. CHESLEY ALLEN

ILLUSTRATED BY R. BRUCE HORSFALL

IT WAS some pastoral writer who said "Where the cow is there is Arcadia," and as far as my own little native village was concerned the converse of this dictum was true.

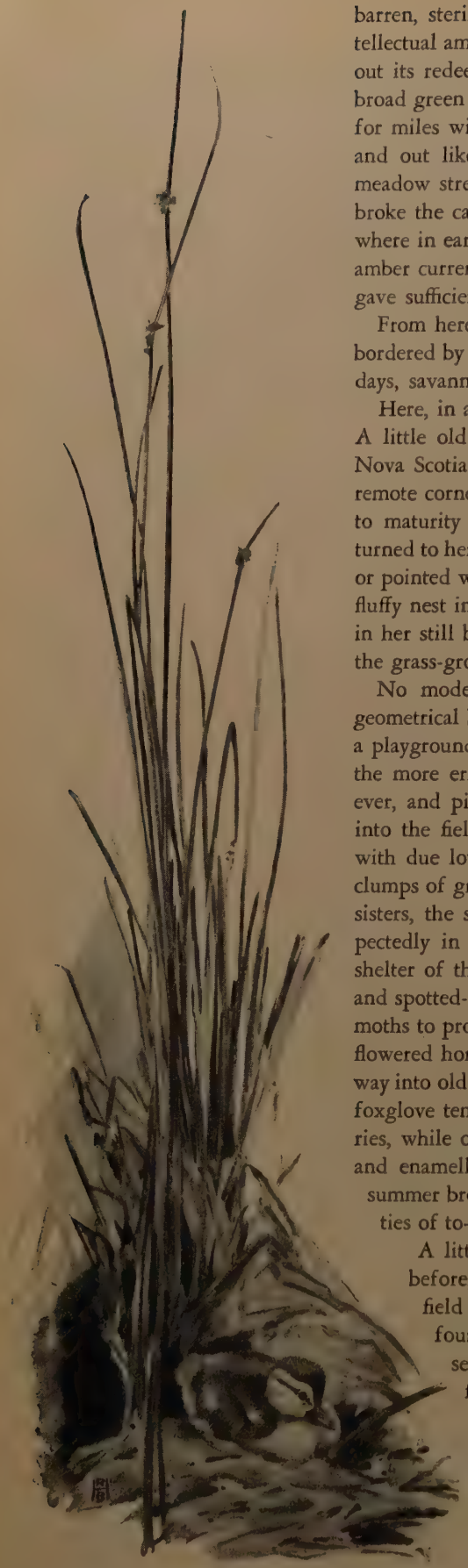
Like many another country boy it fell to my lot to drive these slow-moving, docile creatures morning and night to and from pasture. They were pastured a full mile from home; and the slow journey twice daily over that winding country road indelibly engraved upon my memory song of bird, whir of insect wing, the music of little brooks, the changing pageant of roadside flowers and the ever-shifting forms of high-flying white clouds.

From home the road crossed the bridge by an old mill. Here neither clouds of smoke defiled the air nor coughing gasoline engine offended the ear, but a low musical rumble came from the dark depths, because the power was supplied in part by the waters of a small stream that flowed into the pond above, and in part by the salt waters of the tidal river which at each inrush of flood tide were caught and imprisoned by a great gate opening upstream, and, when the tide fell, fed down through crude but efficient turbines. Here, in spring, the farmers from the surrounding country brought their logs to be sawed or their wool to be carded into long soft rolls. Here, in autumn, loads of golden grain, drawn almost invariably by slow patient oxen yoked "by the head," were brought to be threshed; and, if the tide were low below the dam, the rumble of the mill-wheel and the clatter of the threshing-machine would be heard far into the night.

"IT FELL TO MY LOT TO DRIVE THESE SLOW-MOVING, DOCILE CREATURES MORNING AND NIGHT"

Beyond the mill the road mounted a long low hill and was bordered on one side by a well-kept hedge of English hawthorn.

Over the hill it passed the two little churches, struggling for their very existence in this small village, and the schoolhouse set in its proverbially bare, gravelly yard, quite emblematic of the



"A DOWNY WILD DUCKLING CLOTHED IN TORTOISE-SHELL GARB OF BLACK AND YELLOW"

barren, sterile material with which it was thought fitting to surround the intellectual ambitions of youth. But the position of the schoolhouse was not without its redeeming features. One could look out its rear windows and see the broad green salt marshes, bordered by spruce-covered promontories, and dotted for miles with its conical stacks of hay, while at full tide the river wound in and out like a silver-spangled ribbon. Immediately in front trailed a little meadow stream where miniature brook trout, too small to be worth catching, broke the calm surface between the lily pads with their widening circles, and where in early spring their miniature fry could be found playing in its purling amber currents. A little farther down, the brook ran under an old tannery and gave sufficient power for the grinding of great slabs of hemlock bark.

From here the road led through the lower part of the village. There it was bordered by low stone walls from the tops of which, through the long summer days, savannah sparrows trilled their wheezy, insect-like songs.

Here, in a cottage by the roadside, dwelt a kindred spirit, a lover of Nature. A little old lady, many years before as an Irish lassie, had married one of Nova Scotia's roving men of the sea and had come with him to live in this remote corner of far America. Her husband had died and her children grown to maturity before my cow-driving days, and in her homesickness she had turned to her garden; but often, as she showed me some fresh-flowering treasure or pointed with delight to where the yellow warblers were building anew their fluffy nest in her lilac tree, she would pause, and I would see the mists gather in her still blue Irish eyes as she told me of her childhood days playing amid the grass-grown ruins of an old Irish castle.

No modern garden this, with hard-patterned walks, prim fountains or geometrical beds for the nurture of the latest and most expensive varieties, but a playground for her floral children where they could sprawl and ramble, and the more erring of the flock, creeping Charlie, shiny-leafed myrtle, live-forever, and pink and white mallows, could wander even under the fences and into the fields beyond. Here each appeared in its season and was welcomed with due love and care. Saucy crocus cups defied the late spring snows, and clumps of green-tipped snowdrops were followed by their taller, more graceful sisters, the snowflakes. Blue scillas and little grape hyacinths appeared unexpectedly in grassy plots and daffodils grew in golden clumps in the warm shelter of the cottage wall. Early summer brought bleeding-heart, golden-ball and spotted-leafed lungwort, and the soft June twilight enticed whirring hawk-moths to probe with their long tongues the throats of yellow day lilies. Purple-flowered honesty was there whose flat, transparent seed-pods later found their way into old-fashioned vases on the mantel shelf. Blue monkshood and freckled foxglove tempted great droning black-and-yellow bumblebees into their nectaries, while over the latticed fence at the rear the honeysuckle climbed at will, and enamelled gems of hummingbirds hovered over its creamy horns. Late summer brought hollyhocks and autumn its dahlias, not the bizarre monstrosities of to-day, but chaste globes of purple, red, pink, yellow or purest white.

A little beyond the old garden lay the pasture farm, abandoned years before, and uncultivated except for a meagre crop of hay from the broad field nearest the village road. The farm-house had disappeared and its foundation walls were falling in; but around the ruins stood faithful sentinels defending against encroaching Nature the memory of faithful and loving hands that had placed them there; a struggling lilac tree, a clump of cinnamon roses, double narcissus and black-eyed susans, while clusters of yellow loosestrife spread like starry constellations through the thin grass. But the old barn still remained and was used for the storing of hay. It always repaid a visit. In its gables little yellow jacket wasps built their gray paper globes that grew, envelope by envelope, until the frosts of autumn put an end to their building activities and sent their surviving queens scurrying for more substantial winter shelters. Swift-winged barn swallows dashed in and out through openings in the loose-boarded

walls and their clay-built nests were plastered upon the cross-beams above the fragrant mows. What a mystery about the contents of those clay cups! A mystery to be solved only by climbing the great hewn supporting beams to the dim upper regions, while through the golden shafts of light the anxious parents circled and scolded with sharp cries.

Beneath the barn floor a family of skunks had its den, and in early summer the furry young, their plumed tails waving erect, were led forth to learn the very necessary art of catching insects.

Back of the old field lay the pasture, a long triangle jutting far out into the salty tidal marshes that flanked it on both sides. With its densely-wooded northern slope, its crest and southern side clothed with blueberry, kalmia, rhodora and grass, and its edges serrated with rushy and sedgy coves, it made a roaming-place dear to a boy's heart; and many an afternoon found me wandering over its rolling hills and exploring its sheltered coves hours before it was time to drive home the cows.

At its base lay a grassy meadow with a miniature pond, the haunt of a varied batrachian life. Here in early May a motley host gathered to play their parts in a pipers' chorus, to indulge in their little romances, and to leave their eggs among the water weeds. Great solemn green frogs were there, their white throats palpitating, and the vibrant strumming of their guitars resounding along the surface of the little pond; and wood-frogs in a livery of chocolate brown, wearing dark masks across their eyes, barking out their sentiments with almost human emphasis, and ready at the least alarm to make prodigiously long leaps for safety ("brown leapers" we used to call them). Here too came leopard frogs in their black-spotted coats, and tiny brown hylas clinging to the sedges with their little cup-tipped toes, inflating their throats enormously and adding their shrill peepings to the chorus. Last to join the throng were the toads, short legged and far less agile than their smooth-skinned relatives, but with long-drawn sweet voices that trilled far into the dewy summer nights.

"THE SOFT JUNE TWILIGHT ENTICED WHIRRING HAWK-MOTHS TO PROBE WITH THEIR LONG TONGUES THE THROATS OF YELLOW DAY LILIES"

And the meaning of this festival of song and romance? In a few days the bottom of the pond would show masses of jelly-covered eggs, those of the larger frogs in great masses as large as one's fist, those of the smaller species clinging in smaller masses to the stems of water plants, and the eggs of the toads strung out into long gelatinous cords extending unbroken for yards, and containing from fifteen to twenty eggs to the inch. A few days of warming sun, and the water would be alive with tadpoles; and a rainy day in late summer would find hundreds of tiny black toads emerging into the upper air, choosing such a day so that the sudden change from an aquatic to a terrestrial life might not be too severe upon their delicate systems. But the frogs were more reluctant to leave the watery home of their childhood, and would often go through the following winter in the tadpole state, losing their tails and developing the four limbs of adult froghood during the following summer.

I found that I was not the only one interested in the life of the little pond. A short distance away from the meadow was a rocky mound, the home of agile garter snakes; and these found their way to good hunting among the damp sedges. Many a young leopard frog or brown leaper was drawn headlong down their elastic throats. Here, too, dwelt the smaller green snakes, their richly enamelled green scales and pearly under surfaces making them among the most beautiful of living creatures. At the end of the summer not a loose stone on that bit of rocky pasture remained unturned, for one might find the little red-bellied snake with his chocolate brown coat

and delicate pink under parts, or even more diligent search might uncover the exquisite little ring-necked snake with a band of golden yellow round his slender neck. Creatures of beauty, all these little people of mound and meadow, and all still looked upon with ignorant fear and superstition.

But of all the attractive spots on the old pasture farm the sedgy coves where woodland and marshes met held the greatest allurements. I can look back over the span of years and see one of them now as it lay bathed in the soft afternoon sun of early June. Behind me on the pasture slope rise billows of rose-purple rhodora bloom, while out over the marshes in front the soft wind is moving the fresh green sedges in long slow waves. As I stand entranced by the beauty of it all, from somewhere out among the sedges comes a voice like a whisper, a long-drawn "Swish!" like the long swish of the mower's scythe that would later be heard among those same sedges. But no mower is in sight, and in a few minutes comes again that mysterious "Swish!" from the marsh directly in front. I remain rigidly still, and presently a little brown bird rises from out the waving green, and, flying towards me, alights a few feet away on a tussock of dry grass. He throws back his head, utters two or three sharp but almost inaudible "chips" and ends in that long mysterious "Swish!" (Later in life I am to learn that this is the little Acadian sharp-tailed sparrow, one of the least known of our large family of sparrows.) Somewhere in one of those dry grass tussocks is a nest of the same material where the little brown mate is covering her eggs, but it is almost a hopeless undertaking to attempt to find it, for my approach would be marked from afar, the bird would slip off her eggs very quietly, and, like a brown mouse, steal many yards through the sedges before taking to wing.

"LATER IN LIFE I AM TO LEARN THAT THIS IS THE LITTLE ACADIAN SHARP-TAILED SPARROW . . ."

Skirting the edge of the upland I pass a growth of alders. Somewhere in its subdued green light a catbird is singing a medley of bars stolen from the songs of other birds, but occasionally chuckling softly to himself in his own language as if in high glee over the whole performance. The robin, purple finch, hermit thrush and rusty blackbird come in for their share of ridicule, and then the songster launches into a composition of his own equalling any of the fragments stolen from his kind.

Emerging from the shelter of the alders, I am greeted by a sudden disturbance of the sedges. A black duck rises, and, quacking excitedly, skims the waving tops for a few yards and settles a little way off. Radiating from the spot where she arose the green blades are agitated for short distances in several directions, then all is still. I mark the exact spot where one little path of disturbance stopped; and, advancing ever so cautiously, watching that no careless step should bring tragedy, I discover, crouched motionless amid the browner tangle, one of the most beautiful bits of bird life to be found in the marshes, a downy wild duckling, clothed in a tortoise-shell garb of black and yellow. His tiny heart is palpitating with fear and his bright eye taking in every movement that I make; but, true to that amazing instinct which has come down to him from countless generations through a microscopic cell, not a motion will he make. I know, too, that within a radius of a dozen feet lie perhaps a dozen other downy youngsters all obeying the same great law of perfect stillness under danger. The dusky brown mother rises from her watch station and circles overhead, the smoky-pearl under surfaces of her wings catching the rays of the western sun as she wheels; and, many minutes later, as I wander around the next point of upland, she circles down so close that I catch the whistle of those vibrating pinions. She will be assured of my going and will take no chance of my making a stealthy return and surprising her and her family a second time.

Out across the waving salt sedges the willets, most magnificent of all their tribe, are pursuing each other with loud calls, "Pilly-will-willet, pilly-will-willet," and tempt me to investigate their domestic affairs.

But now from over the pasture hills comes the mellow music of evening bells, a measured "tonk-tonk, tonk-tonk" from the cows wending their way toward the pasture bars. They come down the winding roadway through the spruces, Daisy, Cherry, Fawn and the rest. Reluctantly I fall in behind their line of march. In mild-eyed expectancy they await the clanging of the falling bars, and, as they pass through, the first strumming notes are rising from the little meadow, while from the edges of a rushy pond come the hollow booming notes of a solitary bittern, pumping away on the marsh's edge.

THE EGGS ON THE NEST AND THE MOTHER BITTERN BROODING THEM
They are a pale, buffish color and the usual number of eggs is from four to six. The female bird does all the work of brooding while the male bird seeks pleasure elsewhere

THE BRITISH BITTERN

BY IAN M. THOMSON

PHOTOGRAPHS BY THE AUTHOR

We have in England a most interesting relative of a well known American bird, the bittern. There are few differences between this bird and its North American cousin. The British bittern has been photographed and studied in England, but did not nest there between 1868 and 1911. It is essentially a bird of the reed beds and marshy areas, and as this type of ground has been gradually reclaimed by drainage for agricultural purposes its natural habitat has become more and more restricted. Moreover, it is an easy target for the gunner and his breach loader, and was, for a long time when the mania for collecting skins and eggs was at its height, victimized by eager bird students. Finally, however, a strict protection was enforced by a few interested land owners in that part of East Anglia known as Norfolk.

Certain parts of Norfolk are extremely suitable for the nesting of the bittern, however, as there are large stretches of water, known as the Broads, situated close to the sea and easily reached by migrating birds. These broads are surrounded by vast reed beds and it was in one of these

SETTLING DOWN TO HER CLUTCH OF EGGS IN THE SUNSHINE

At the right the mother bird's head is raised in alarm at the sound of an intruder and she is able quickly to merge herself with the surroundings

that two well known bird observers discovered young bitterns in 1911. This was a "red letter day," and since then my friend, the warden of one of these estates, has found more than sixty nests. It is to be hoped that now the bittern is firmly re-established with us it will gradually spread to other of its old haunts which still remain suitable.

Historically the bittern is mentioned through the ages, and it was considered so royal a dish that one old law made it criminal to kill it in the marshes around Ealing. To those of us who know Ealing as it is to-day, a thickly populated and thriving portion of the great metropolis, such an order seems unnecessary.

It was in 1926 that I first heard and saw a bittern. A friend and I were on a June holiday and were living in a caravan. We were bent on photographing bird life and had chosen Norfolk as a haven for fresh species.

After supper the first night we were smoking and hating the idea of washing up the dishes, when a strange noise came to our ears across the fields. "What on earth was that, Henry?" I said to my friend. The well-fed Henry merely grunted, "Some old sick cow, I should think." "I believe it's a bittern!" I exclaimed, and at that the lethargic one jumped up and suggested we visit a farm nearby to make inquiry. This we did and while talking to the farmer we again heard the strange noise. "Oh that is only an old bittern," said he and could not make out why we were so thrilled.

But our investigation of a large stretch of water surrounded by reed beds, whence came the "boom!" proved

AN INTIMATE GLIMPSE AT THE HOME LIFE OF THE BRITISH BITTERN
Three youngsters on the nest; then the youngsters gripping the mother's bill crosswise as they feed; then mother listening intently and suspiciously

fruitless. Since I now know a good deal more about the habits of this interesting bird, I realise we were too late for a nest (it was mid-June), and from the way the old bird behaved—she was flying to and fro between her feeding ground and youngsters, which had left the nest.

It was in the July following I was again in this area and was shown a young bittern, which was probably the last of a second nest, the first having come to grief. My friend reported about the third week of the following March that he had found a bittern sitting on two eggs and that we could start operations about the second week in April, and this we did.

The bittern starts to incubate as soon as the first egg is laid, and eggs are laid on alternate days. These are a pale buffish color and the usual clutch is four or six. Naturally under these conditions the young ones do not hatch together and the youngest usually fail to survive and, I am told, have been known to provide a course for their more vigorous brothers. In the several nests I have seen the full complement of young were never present. But when we came to set up our "hide," there were five eggs and the mother was sitting on them.

I will always remember the thrill I had when I was first shown the bird on the nest. As we approached my friend beckoned me to his side, and showed me the hen sitting with head erect (a pose I was soon to learn was so characteristic) not more than twenty feet from us.

As we moved forward she left the nest and circled above us a few times, uttering her strange notes of "Aark, Aark," then departed. We hurriedly put up our "hide," covered it with reeds and went away. I was delighted the following day to receive a telegram from my friend telling me the bird had taken to the "hide" and was sitting hard.

I returned the following week-end and we set out next morning in a Norfolk punt. I will always remember that morning of glorious sunshine and not a breath of wind. Having flushed the bird, I hurriedly placed my camera in position and got inside the "hide." Having arranged everything, my friend covered me up, wished me luck

and left me to the enjoyment of the marsh creatures.

That beautiful April morning the reed beds seemed teeming with life. Quaint little splashings in the shallow water took place all around. The songs of birds and the hum of insects were continuous.

After about forty minutes I suddenly heard a different noise—the sound of a heavier creature moving towards me in the reeds. Then it stopped and in a short time started again. Looking through my "peephole" I could, at first, see nothing, but gradually I was able to make out the form of the bittern standing in the reeds behind the nest. She was all attention. It seemed an eternity before she decided all was well. Then she slowly moved to the nest, and after much turning of eggs she settled down.

It was almost an hour before I risked exposing a plate, and then the unexpected happened. She took no notice whatever. I exposed several plates that morning and it was not until I inadvertently knocked over my camera stand that she put up her head in an attitude of suspicion.

It is wonderful how this huge bird with her striped throat markings can at will apparently diffuse her body into the surrounding reeds and become practically invisible. She soon resumed her normal pose, however. Some time after this, up went her head again. She had heard my friend approaching to relieve me, but it was not until he was immediately behind the "hide" that she left the nest.

We were both delighted with our first day's work, and more so when I developed my negatives. Examining the eggs before leaving, we had found one was chipped, so hoped for a chick on the morrow. This was not to be and we found that in each case the egg took forty-eight hours to hatch from the first sign of chipping.

On the third day the first chick was hatched, and a quaint little golliwog it looked, with its fluffy light brown down. At this age, weak as it was, it uttered a feeble bubbling note which I had heard the old bird use beside and on the nest.

The tender way this large bird treated her new born youngster was wonderful, and the gentle way in which she broke off a tiny morsel of partly digested fish which she regurgitated from her crop, was charming, although the method of producing the meal was not pleasant.

As the young ones hatched out she was careful to see that the weakest got his share and as the youngsters grew the feeding process became a much more violent affair. The eldest chick after a few days would seize his mother's bill sideways and a tugging and pulling match took place. This, combined with the continuous bubbling notes of the chicks, made the whole episode most exciting. When a fish arrived it always looked impossible for a young one to swallow it, but all seemed to have a kind of folding portmanteau mouth and jaws and they were able to handle fish almost as big as themselves.

It was about this time that number four and five chicks ended their existence; how I cannot be certain. I also noticed that during this violence at feeding times when the old bird's mandibles were seized that, to begin with, a slimy kind of matter appeared from the sides and found its way into the young ones mouths, and then the partly digested eel or fish was ejected. At times this seemed to come from the side of her mouth, and at others, when she was able to free herself from the eager grasping of the chicks, it was deposited in the nest.

This violence increased as the youngsters grew and the whole affair is like that which takes place at the nest of the bittern's cousin, the heron.

A most unusual behavior was noted in the old bird as the young ones became bigger. This was the increasing shyness of the parent. At the commencement of my observations she had paid little or no notice to any noise in the "hide," but a rapid change took place from the hatching of the first chick. When the young ones were fourteen days old I had to wait sometimes as much as three hours before she would return to them and then it was nearly certain that I would obtain only one exposure during her stay.

As it was fine and sunny weather it may not have been necessary for her to visit the young ones except for feeding purposes. It certainly appeared that a mother's care was unnecessary except from the point of view of feeding, as they basked in the sun, fought each other, then slept and then preened their sprouting feathers.

At last the young bitterns started to leave the nest, and observation became increasingly difficult. But as my time was restricted, I was glad that they left before I did, as I did want to obtain as complete a record as possible of the life story at the birthplace.

I have made little mention of the male bittern because unfortunately he hardly comes into the story. I had great hopes of proving that he at some time visited the nest. One day the hen was on the nest asleep, when I heard a similar noise to that which she made on approaching the nest. She wakened and was all attention, and behaved as I have seen hen birds of other species act at the approach of the male.

I imagined I saw him standing in the reeds behind the nest, but the steps were retraced and then I heard the loud gulping intake of breath which is always the preliminary to the boom. Four times he boomed and then some five minutes later repeated the performance but at a greater distance.

I have heard the males booming at all hours of the day and night, but it is in the early morning and in the evening when all is still that they prefer to show off to their mates and compete with each other. This strange and eerie note in the quiet and balmy evenings can be heard as far as three miles.

It is a most remarkable fact that the American bittern should have been described first from a specimen taken in Dorsetshire. Perhaps it came to England by way of Greenland, because it has been known to wander to that bleak land from its usual haunts on the American continent.

I must now take leave of this bittern of the Norfolk Broads, which is so alike to its cousin of the great American Continent, and I hope that one day I may be able to compare the slight differences between the two.

PHOTOGRAPH BY B. L. BROWN

THE GRAY SQUIRREL, BUSY LITTLE RODENT OF FOREST AND PARK

So familiar are they that we scarcely notice them, but when they start to migrate in numbers, swimming streams in companies, they attract widespread attention

THE GRAY SQUIRREL MIGRATION

BY GEORGE G. GOODWIN

ASSISTANT CURATOR OF MAMMALS,
AMERICAN MUSEUM OF NATURAL HISTORY

NOTHING in the history of Nature is more inspiring than the migrations of animal life. In the fall, long lines of swallows resting on the telephone wires and cables are a familiar sight to almost everyone. Just as regular in their drift southward are the many species of insectivorous birds and the great wedges of Canada geese. In the north the caribou congregate in herds of many thousands to travel north and south with the seasons. Insect life, too, takes a prominent part in these annual migrations; the monarch butterflies mass together in thousands and silently float away with the warm summer. Salmon also travel many miles from their salty home to spawn in the upper reaches of the rivers. Some bats accompany the birds south, while others have other means of defeating the foodless cold northern winters—they hibernate. What impulse urges the travelers to leave at the appointed time and move in the right direction remains a mystery.

These annual flights we know are governed by climate and have definite ends in view, either to follow the food supply and avoid the cold, or to breed.

The sporadic migrations of the gray squirrel are more puzzling and will be found in a different class. A careful review of the evidence makes it clear that these migrations are not governed by a periodic or seasonal movement. Judging from parallel cases such migrations could only be attributed to one or more of five causes—overpopulation, famine, pests, fire or flood.

Tidings last December of a gray squirrel migration from New England westward into New York, appeared in an amazing journalistic write-up in nearly all the eastern newspapers and even in the western as far as British Columbia. In some leading New York papers it rated as front page news. The last great migration on record took place in 1866 when an old settler of Bay City, Michigan, counted 1400 squirrels while driving two miles. Seton, calculating from his wealth of available data on the gray squirrel, estimates that one of the major movements would mean 30,000 squirrels to the square mile, or 450,000 animals in the migration. The squirrel movement of 1933, according to Mr. Anthony, can not boast of any such numbers, because the primitive forest areas are now cut and the favorable environment greatly reduced, so the squirrel reservoir cannot fill up and overflow with its ancient vigor. Nevertheless, this year's squirrel movement is interesting and unusual. The reports agree in the direction of the move, from east to west, and the squirrels must cross formidable rivers, since the prevailing drainage is from north to south.

The first indication of trouble among the gray squirrel population was a report during August from Fairfield County, Connecticut, that a number of squirrels had been

observed with bare patches and rat tails. A specimen was sent to Dr. Erwin Jungherr, pathologist of the Connecticut State College, to analyze for suspected tularemia, but a detailed bacteriological examination of the squirrel failed to isolate those organisms. The skin lesions indicated a condition resembling papillomas, which are infections, and thought to be due to a filterable non-bacterial agent, in the nature of benign epithelial tumors. This diagnosis, while only individual, is interesting, as tularemia, a disease known to be prevalent among rabbits in America, might have been suspected as the cause of the migration. Such a theory would receive support from the unexplainable urge to quite uselessly gnaw things. Mr. R. P. Thompson, who has access to the telephone toll cables for the entire state of Connecticut, reported considerable damage by gray squirrels to lead cable sheathing in the line of migration during September and October, but no damage was reported for December.

PHOTOGRAPH BY L. W. BROWNELL

POISED AS HE SCENTS DANGER

Over-population, famine, pests, fire or flood are the usual causes of the migration of squirrels

Superintendent Arthur L. Clark, of the Connecticut State Board of Fisheries and Game, received numerous complaints from farmers that gray squirrels were causing serious damage to crops during September and October, which shows that the squirrels stuck closely to cultivated districts, especially when it is remembered that Mr. Thompson's report showed that the only cables damaged by squirrels were in populated districts or near farm houses. This would tend to indicate a failure of the natural resources in forested and unfarmed lands. In early September official reports from Windham County, in extreme eastern Connecticut, state "gray squirrels doing great damage to farm crops in this county, one-third of 10-acre field of corn destroyed by gray squirrels. On the farm of Deputy Warden Colburn at least 20 bushels of corn taken by gray squirrels. . . . Shortage of nuts and acorns this year and squirrels very numerous. . . . Last week saw a gray squirrel swim across Alexandria Lake, which is at least three-quarters of a mile wide." Late in August and early in September, investigations showed that gray squirrels were over-abundant and damaging crops in New London County.

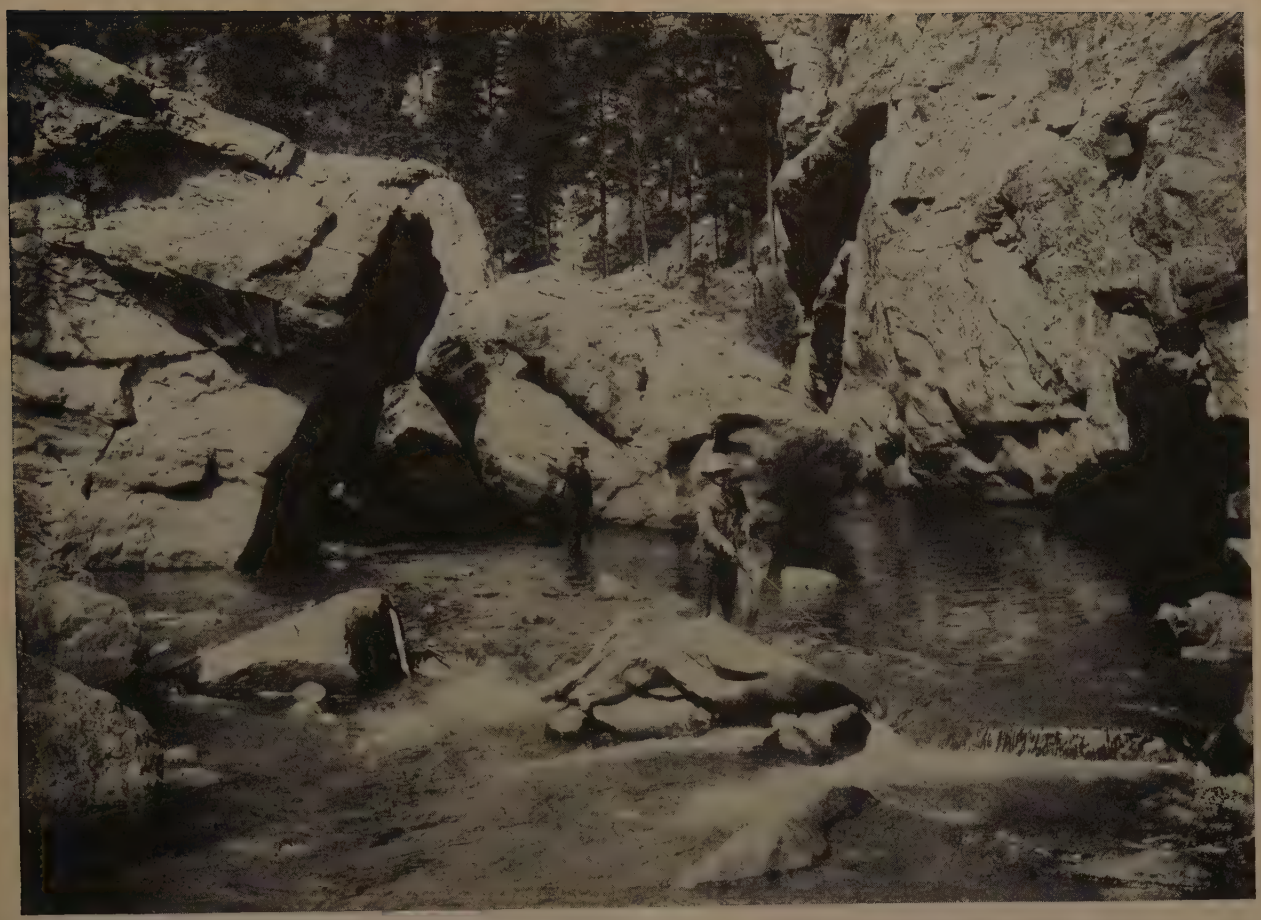
A careful survey of all the accumulated data shows that the origin of the migration was east of the Connecticut River, probably Rhode Island or extreme eastern Connecticut. The Maine Fish & Game Department reports more gray squirrels than usual for 1933 in the southern part of the State, but no migratory movement was observed.

The extent of the present migration is difficult to determine; it appears to have practically carried the whole state of Connecticut.

The earliest official report of the actual migration was Sunday, September 24, when 76 squirrels were counted swimming across Snipsie Lake, Tolland County, from east to west. On Lake Columbia, ten miles south in the same county a large but indefinite number of gray squirrels were also reported swimming in the same direction, and on the same day more than a thousand were noticed swimming the Connecticut River between Hartford and Essex. Many of them became exhausted and were drowned. Some climbed up on logs or anything else they could find, on which to rest. Still others climbed into boats, generally sitting on the bow until rested, or the boat approached the shore, when they scampered on their way. About this time an individual, Mr. W. F. Clark, while working along the Connecticut River near Essex, counted 33 gray squirrels swimming in a westerly direction, but not over two at any one time. A follow-the-leader movement in a large pack of animals is fairly conceivable, but when an individual squirrel will unhesitatingly swim the Connecticut River, it must be possessed with an urge that is something more than normal courage.

Early in October an unofficial report seems to indicate that a number of squirrels re-crossed the Connecticut River from Middletown to Portland from the west to the east side. The majority apparently continued toward New York, and the advance of the migration can be followed westward to the Hudson. Fore-runners were reported in the latter part of September swimming Rye Lake, New York, but the main body of the migrants swam across the Connecticut River on September 24, stragglers continuing to cross near Lyme on the first of October.

Mr. Richard Kuerzi, who made observations of the gray squirrel movement on a fifteen-mile stretch along the Housatonic River from Kent to West Cornwall, Connecticut, states that the gray squirrels were constantly on the move in a westerly direction, for a period of over two weeks last November. During that time a casual observer could, in an ordinary walk, count at least twelve or more gray squirrels on the river itself and a great many swimming in a very direct manner. They swam strongly and upon arriving on the opposite shore proceeded immediately on their course. One attempted to climb aboard a boat in mid-stream, but most individuals avoided it. The squirrels appeared in good condition and the fur was equal to or above the average (Continued on page 255)



BIG TROUT LIKE SHADY SPOTS IN CANYONS LIKE THIS

There the enthusiast of rod and reel will seek them to match his wits against their wile, to battle this royalty of the stream and gather material for many a fish story

THE FIGHTING SALMO

GAME FISH OF THE RAPID MOUNTAIN STREAMS

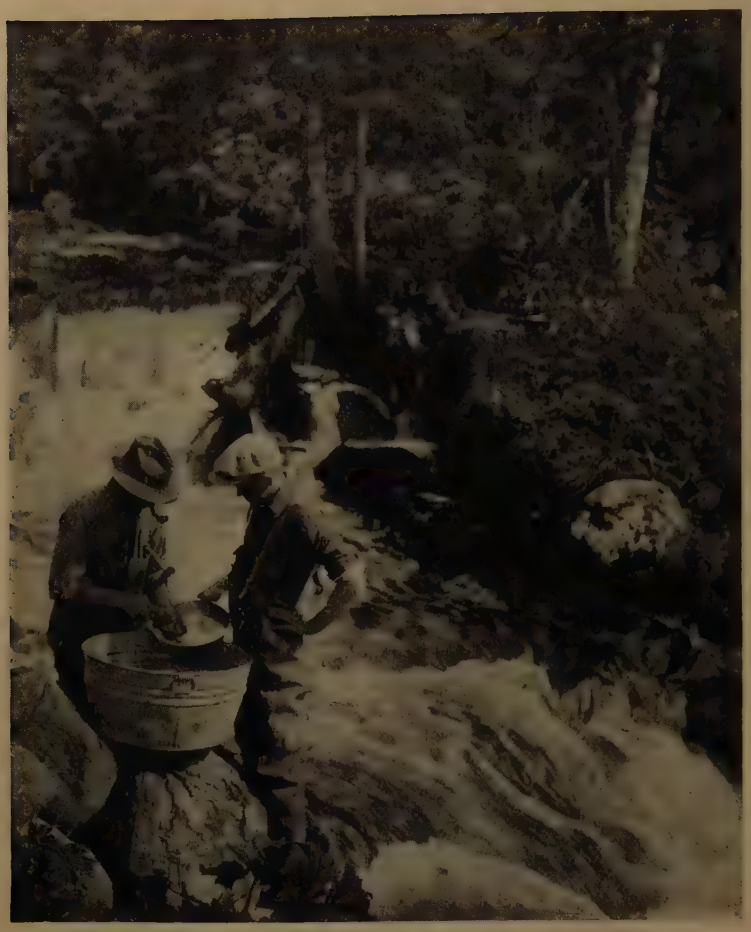
BY ARTHUR HAWTHORNE CARHART

TROUT fishermen are slightly touched by a mild form of odd lunacy. Just to think of the moment when there is a fighting trout on the end of a line, the reel singing, the fish leaping free of the water to shake his head, then falling into a pool only to dart like a streak for the other end of the stream, puts the ardent trout stalker into a dizzy excitement of rod-and-creel fever.

Under such a stress, you may find enthusiasms of the fisherman creeping into this article because I am one of those mildly lunatic fellows who will lose two dollars worth of tackle, a day's time and have several square inches of skin rasped off my carcass by rough rock or shaggy-barked tree just to bring in a frying pan full of the gamiest fish of the streams, our Rocky Mountain Trout. Still, everyone who is a genuine devotee of the rod and reel, everyone who is willing to be classed with those who may be called conservationists as well as sportsmen, not only has to know game and how to take it, but he must know something of habits, family life, food preferences and other intimate secrets of the wildings. Here are a few bits of interest I have gathered concerning trout and the other fish that live in the streams that break away from snow banks and high springs up near the crest of the Continental Divide.

Before we begin trotting out trout truths, it might be well to suggest that there are other fish, native and "planted" in the western country beside His Fishiness, Sir Salmo. The Arkansas, the Platte, the Missouri, all are feeders of the Mississippi. All have headwaters in the Rockies. They offer a watery highway for finny vagabonds of mid-America to invade the west. We find wandering wall eyed pike, occasional pickerel, the ever present sucker, the roaming catfish, the darting minnows and other fish life of this series of rivers that are all tied together, extending to within a few miles of the foothills. South of the main Rockies, reaching into Colorado, is the Rio Grande and what is true of the Mississippi is also true of the Rio Grande, the fish life typical of the river swims up to points just within the foothills.

On the western slope of the Divide the Colorado River has distinctive types of river fish. One unusual fish of this river in its upper reaches is a minnow, *Ptychocheilus lu-*



TAKING SPAWN BESIDE A MOUNTAIN STREAM

Stocking streams and lakes with trout is now a widely practiced science and a vital part of fish conservation

cius. But it grows to be five feet long and sometimes weighs more than one hundred pounds! Now there's a bait for you! Minnows grow big in these western streams.

Farther north the western drainage is toward Great Salt Lake in the intermountain region, and still farther northward it drains through the Columbia and its tributaries. Here we find the salmon. Here we find trout. And all up and down the Rockies, where foaming mountain streams rush to form rivers, are trout.

Let us pause here to note that trout and salmon are classified in a closely allied group. The trout, chars, and salmon are all Salmonidae.

Do you remember how the fact that the robin is closely related to the thrush is betrayed by the spots on the young robin's breast? And how the tawny bob cat kittens are sometimes dappled not unlike leopards? The Salmonidae babies have what are known as "parr marks". They are little vertical stripes on the fry soon after they are hatched, but they disappear after the fish have started to grow up. All of this group have these parr marks when they are young.

The grayling, which puts up a wild and glorious fight for the fisherman and is rated along with the trout for his sagacity and gameness, is not closely akin to trout. He is *Thymallus* and *T. montanus* is the grayling of the northern Rockies. The grayling is not found in Colorado and southward. Williamson's whitefish, *Coregonus williamsoni*, is often mistaken for a grayling. Lewis and Clark were perhaps the first travelers to meet with the Montana grayling in the region of the upper Missouri River.

Unlike the fish typical of the lower river reaches, the grayling is one of those fish willing to fight his way into mountain spume and froth. In that respect as well as his gameness, he is distinctly on the same footing as the trout and his family.

Put mountain trout in the same waters as perch, sunfish or carp and the trout soon will capsize and quit life. It is above the plains areas that you will find most trout. They are a high country fish. It is not the warm water found in the plains rivers so much as it is the oxygen that brings the trout into the hills. The mountain streams, with riffles and falls, continually pound free oxygen into the water. I have run chemical tests on slow-moving streams back in Maryland where the dissolved oxygen content was from nine to fourteen parts per million. Fish of the sluggish rivers would thrive on that amount of oxygen. At a point where one Maryland stream lost all but three parts per million of dissolved oxygen, fish died or smothered. Mountain streams may have fifteen parts per million or more of dissolved oxygen. Mr. Trout, a racing, fighting, fast moving fellow, lives in faster tempo than a catfish, and he demands more free "air" in his waters. That is why they are found in streams that churn, riffle, fall and tumble.

Colorado, where most of my mountain trout experience has been secured, has four native trout. In general the fisherman will class them all as "natives." Actually there is the green-backed trout, the Rio Grande trout, the genuine, universally distributed, Colorado trout, and the yellow-finned trout. Curiously the yellow-fin has been found only in Twin Lakes. It is a species rarely taken by anglers.

Those are the original settlers of the trout tribe to be found in Colorado's Rockies. But there are immigrants here as well as biped settlers.

Eastern brook trout, one of our fish settlers, is not a Salmo; he is *Salvelinus fontinalis*. That is why the brook's spawning season is in the fall, often extending into snowy December days, while all of the true Salmo spawn in the spring or early summer. In many of our lakes and streams the Eastern brook has found good habitat. Our dyed-in-the-wool western trout fisherman may say that a brook cannot begin to compare with a native or a rainbow for fight or for eating purposes. But I have never yet seen a troutsman cast one away after he has hooked him on a fly.

The members of the Salmo or true trout group that have been planted here come from various sections. There is the land-locked salmon, which has developed from ocean-going salmon that have been spawned and caught and held in fresh water until they have forgotten the sea

A CREEL FULL OF "NATIVES" IN THE ROCKIES
These are one of several kinds of trout found in mountain waters, some of which belong there while others have migrated or have been stocked there and naturalized

and its salty call. There is the Shasta rainbow trout which has come to us from California and is a good fighter. The brown, often miscalled the "German brown", comes from English waters. The brown is not found in abundance, but old plantings sometimes supply a few big, buff fellows that are glaringly distinct from our natives or other salmonish trout. The Loch Leven has been planted in Colorado in a number of places, but as it is a type of the brown, it has been found that it often reverts rather than retains its brilliant colors. That is why some enthusiasts have planted lakes with Loch Leven and have caught browns out of those lakes.

Another trout, not of the Salmo group but found in a number of Colorado lakes, is the Mackinaw trout, *Cristivomer namaycush*. It has been my experience to catch the Mackinaw at only one mountain lake—in the Holy Cross National Forest not far below the Continental Divide and about eight miles back from the nearest highway.

The amazing story of how man has stocked streams and lakes of the Rockies with planted trout is a saga of men vitally interested in the outdoors; sportsmen willing to work for and fight for the American outdoors.

Here is just one example. Up near Cloud Peak, the highest point of the Bighorn Mountains, over a ridge from Soldier Park, are the Seven Brothers Lakes. Each is fresh, cold, typical trout water. But the connection between each lake and the next is through tangled rocks, so closely intertwined that fish cannot get through the narrow-crevised maze. In one lake you may catch rainbow, in another natives, in the next Loch Leven, in another the brown, the brook in another. August Hettinger, old time forest ranger on Buffalo Creek, toted those fish in there over four miles of mountain trail. He carried them on his own back in water-loaded milk cans and planted one species in each lake. That in brief is the story of many trout plantings in the high mountains.

Today the fish population of our mountain streams is kept up by artificial plantings. When spawning time comes the female normally seeks a place in sandy riffles where she can lay her eggs. There, under aerated water, she "fans" a clean nest. The eggs are deposited and then the male fish fertilizes them with the whitish milt. If natural enemies do not prevent, those eggs hatch into tiny trout which have many gauntlets to run before they are large enough to catch.

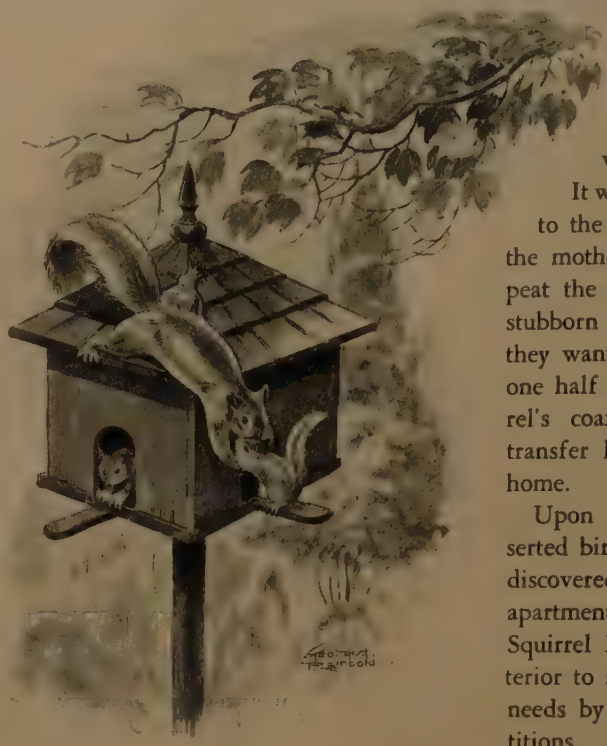
In artificial fish culture the "breeder" fish are kept in tanks or limited lakes. As they become "ripe" the females are stripped of their eggs. These eggs are "green", that is, unfertilized and may be shipped distances before being fertilized. Shipping is done in damp moss-lined compartments with ice placed so the drip will keep the moss both wet and cold.

But if the eggs are to be fertilized immediately they are stripped into a bucket containing fresh cold water. Milt is stripped from male fish into the bucket and this is stirred until all eggs are fertilized. The eggs are then placed in trays where spring water of the proper temperature will flow over them continuously. A healthy unfertilized trout egg is a pure, translucent amber. After a matter of a few days fertile eggs start to show bloodshot. Then this coloring will work toward the center. It gathers to form a tiny head and tail. The head grows one way out through the side of the egg; (Continued on page 259)

TREETOP MOVING DAY

BY GEORGE W. REINBOLD

A MUCH agitated gray squirrel, with twitching, plumed tail and stamping feet, was perched on the roof of our four-apartment bird house. We wondered what could have caused it so much annoyance. Suddenly the fuzzy, little gray face of a baby squirrel peeped furtively from one of the doorways of the bird house. Fuzzy faces appeared and disappeared in the other birdhouse doorways. All the while mother squirrel kept up convulsive movements of tail and feet, chattering to the children.



At last one baby emerged from the doorway and swayed precariously on the narrow perch. Instantly mother squirrel slid over to the edge of the roof and, with hind feet tightly grasping the shingles, the fore part of her body hanging over the eaves, she reached down with her fore feet. She grasped the frightened child under the forelegs and quickly drew it over the edge of the roof to safety. Then, to our amazement, the baby immediately clasped all four little legs around the under part of its mother. She leaped to a low hanging branch of a tree nearby, and scurried along its length to the trunk, down to the lawn, and away through the shrubbery until lost to view.

It was moving day, and back to the roof of the bird house the mother squirrel came to repeat the performance. But how stubborn children can be when they want to. It took three and one half hours of mother squirrel's coaxing and patience to transfer her babies to the new home.

Upon examination of the deserted bird apartment house, we discovered it was no longer an apartment house. Madame Gray Squirrel had remodeled the interior to suit her own particular needs by gnawing out the partitions, thereby creating one large living-room, accommodating the nest or cradle for the comfort of her three fuzzy, gray babies.

A TREE FOR POSTERITY

BY HOWARD CLEAVES

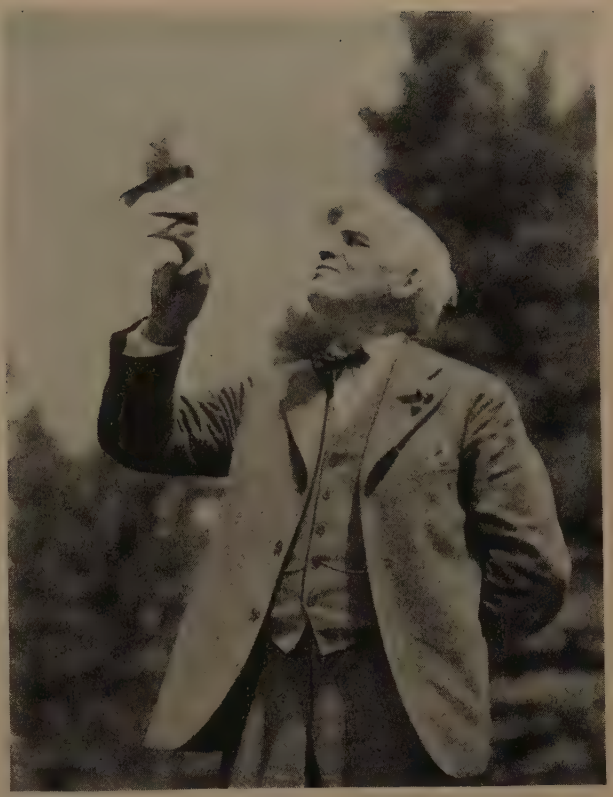
BETWEEN fifty and seventy-five years ago Judge James Fitch, an inveterate trout fisherman and Nature lover of Prattsville, New York, was driving along a country road near that Catskill town when he saw a farmer apparently preparing to cut down a vigorous and shapely American elm that grew in a nearby field. Promptly leaving his horse and buggy the Judge made for the spot and engaged the farmer in conversation. Sure enough, the man was on the point of slaying the tree, explaining to Judge Fitch that crops could not be grown in its shade and that he needed the land. Whereupon the Judge offered to buy the land on which the elm tree stood. The idea proved novel and attractive to the farmer, and so a bargain was struck then and there.

PHOTOGRAPH BY HUGH P. CHRISP

The price paid for the tree and the ground under it is said to have been about twenty-five dollars. The late Professor J. P. Silvernail of Rochester, who related the incident, lived near the place when a boy and knew Judge Fitch. According to the Professor a deed to the plot was duly drawn and recorded with the county clerk at Catskill, seat of Greene County. To Hugh P. Chrisp, son-in-law of Professor Silvernail, I am indebted for the photograph of the now patriarch elm—a picture taken quite recently.

"What a man and what a tree!" one might well exclaim on hearing this story. What an investment in sentiment and beauty! What a gift to posterity! How infrequently are such stories heard!

BABY FEEDING ON A FINGER PERCH
The mother bird hovering above her offspring preparing to pass on a luscious bit of insect



A SALVAGED SWALLOW

BY D. W. STOCKING

DULUTH has a long, tedious and dreary spring, rather promise of spring, so it is with joy and anticipation that our family awaits the arrival of tree swallows, the wearers of royal purple. They soar in about the twenty-first of April, a bleak season indeed. Little fuss they make after their long trip from the far south, sitting for hours on telephone wires near last year's nests, quite listless, almost silent, as though in need of rest.

Tree swallows in our yard show a taste for homes made out of cedar logs and to attract them we select each year hollow old cedar trees about ten inches in diameter, and saw sections for nests from sixteen to eighteen inches long. If necessary we chisel the center section out, leaving the sides half an inch to an inch thick. Our house must have a roof and a floor, so we nail these on fast at either end. The doorway is located about six inches from the roof and is about an inch and a quarter in diameter. To make the inside cozy we sprinkle dead wood which has accumulated in the process of hollowing the log, but sawdust would do just as well. We have hung these log houses from limbs of trees and under available eaves, and have also placed them on poles. Their exposure is always away from the direction of regional storms and rains, so the babies will keep warm and dry.

A favorite domicile last summer was a hollow cedar log hung under the eaves of the garage within six feet of the kitchen window observatory. After a rest of about ten days the bride and groom entered their home, and we began to see the activities of housekeeping. In a few weeks time a busier atmosphere never existed. While the highly colored father was abroad in quest of bugs, beetles, and flies, the mother with her supply would swoop from high aloft, plunge at a perilous rate of speed, and enter the tiny hole on a non-stop flight. How she escaped mortal injury each time she made this breath-taking drop is a mystery. The babies would each put up a howl to be fed first, and we could hear them coaxing for more, and still more. Both parents were kept on the wing constantly, seemingly never resting, except at odd moments on the telephone wire within call of their youngsters.

One day a little head with purple top and white bibbed throat appeared. Though we approached close to the tree swallow home and cooed to the young upstart, no sign of panic or fear was apparent.

On a morning in July great excitement reigned. The parents and all the young, except the baby shown in the photographs, assembled on the wires with great chattering. The youngster in the nest made lusty calls, but its

"SOCKS" WAS NOT A TRUE BIRD LOVER
She would sit, quivering, watching the baby bird being fed and wondering about this new pet

parents, totally ignoring him, did not feed him, and soon they flew away. At first, I thought the grown-ups were trying to force the laggard out by hunger, but I have concluded that instinct led them to feed their normal young, and to leave the little unfortunate to his fate.

He grew restless, however, and struggled to leave his home as had done the rest. At the end of great exertion he lay on the cement driveway below. He was then transported by human hands to the lawn where he fluttered his immature wings, one of which seemed somewhat stunted. To our astonishment and great delight the old birds swooped down to him with food. We next perched him on our heads where he hopefully fluttered his wings and called loudly, and was fed. Then he was transferred to our fingers for a perch. From that time forward he preferred one's finger to any other resting place, and in fact would peck the hand at being transferred.

THE ACTUAL PROCESS OF FEEDING

The fledgling's mouth open and ready and then the mother bird delivering the meal direct to the youngster's throat

At such close range we inspected the whole process of feeding and managed to take still and moving pictures of it. The parents capture all their prey a'wing, then come home to supply their infants. We noticed that the young one fluttered and fussed long before we could discern the presence of the adult, then opened his beak while Mother put the insect well into his throat. The pictures portray the exact position of the respective bills, revealing unusual poise and balance on the part of the flying parent.

Late in the afternoon we returned the little fellow to his home nest and barred the entrance by stretching a rubber band across the opening. But not once did we see the parents endeavor to feed him at the nest. It seemed to require the combination of fluttering wings and pleading calls in the open to gain their attention from their nearly mature other three, whom they continued to feed.

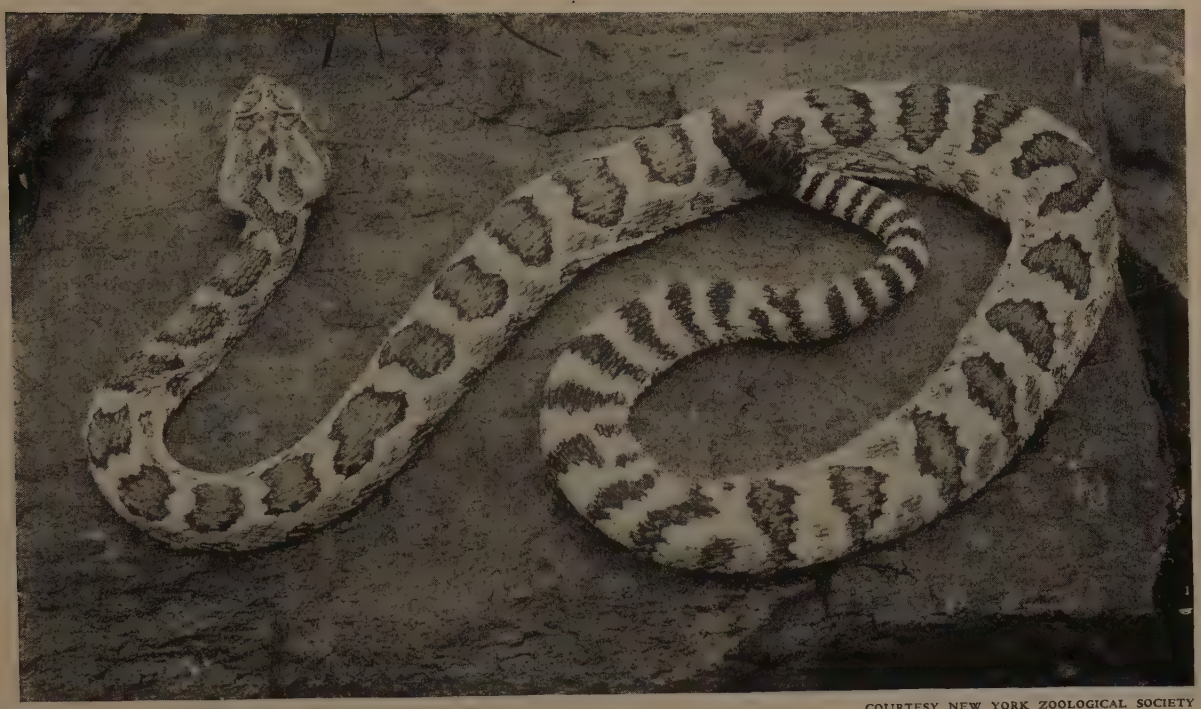
"Socks," an English setter, was the only member of the family showing anything but the Beatitudes. She had to be held by a chain to thwart her instinct to make a sudden lunge on our latest pet. She would sit aquiver with intent, calculating and inquisitive aspect about three feet from the pampered fledgling, and the bird had no fear, seemingly putting its trust in us.

Daily the youngster grew stronger, which was most pleasing, as we feared he might be abandoned. Our "fly" season was about over, and our efforts to serve him with other foods, the yolks of eggs, choice chopped angleworms and suet, had proved futile. He disdained all except that brought by parent wings.

When human hands were not available as perches—for we also had to eat—we placed him on the edge of a felt shoe to which he could cling. Soon he was making short flights about the yard, his wing daily becoming stronger, yet he eagerly returned to an outstretched finger. On the fifth day he flew to the swallow living room on the telephone wire, and with his parents he soared away to the far South, leaving us desolate and lonely.

●

Let us take a look at the schedule for the June issue of Nature Magazine. First we find that it contains another fascinating story by Charles Fitzhugh Talman, this time on waterspouts; known as "the dragons of the deep." Also in the marine category is an entertaining story about undersea life based on first-hand observation in a home-made diving outfit. There is another fish story, this time about the sturgeon. Skipping over to England we read the story of the monkey puzzle tree known as the "grandfather of the pines", a tree which once flourished widely in South America and is now found almost exclusively as an ornamental. For the gardener there is a notable article on attaining a succession of bloom in the rock garden. That is not all, but it gives an idea of interesting things in store for next month



COURTESY NEW YORK ZOOLOGICAL SOCIETY

A BEAUTIFUL SPECIMEN OF PACIFIC RATTLESNAKE
This is a larger and older specimen than that about which the author writes but the photograph gives an idea of the beautiful markings and appearance of this reptile

"SPOTTY," A PACIFIC RATTLESNAKE

BY W. HAROLD GAMBLE

"I HAVE two baby Pacific rattlesnakes. Want one?" said the letter from my friend in Florida. My answer, an emphatic "yes," went rapidly back to him, and one day in April a box ominously labeled "BEWARE! CROTALUS CONFLUENTUS OREGANUS" arrived. It created some commotion in the school post office, a state of mind that was not much relieved by the information that that was the way the scientist describes a Pacific rattlesnake.

The newcomer had made the trip in a tin can with a few holes punched in the lid. When I took off the lid, however, I thought he must have either found the voyage too much for him or he had miraculously escaped. All that was visible was grass and moss, so I turned this all into the glass home that had been prepared for my pet. Out crawled a beautifully marked little reptile to be immediately christened "Spotty." I decided at once we were going to get along well together. We always have.

The next day it was plain that records should be kept of "Spotty's" progress in life. Protected with heavy leather gloves, I invited him out of his home. He crawled over to my hand and tried out a glove with his flickering tongue; then he climbed on my hand. My fingers closed around him and he struck. His small fangs, however, were unequal to piercing the leather. Poisonous snakes are born with a perfectly developed poison apparatus, but in the quite young this is not as powerful or as toxic as it later grows to be. "Spotty" soon quieted down in my hand and I put him on my desk. Holding his head with a forked stick, I straightened him out along a ruler. Eleven and one-quarter inches from tip of nose to tip of "button," the record shows.

This "button" is interesting. It is the first ring or segment of the future rattle. The snake adds the second segment with his first shedding and then has the real start of his rattle. One of the various Nature fictions is that a rattlesnake's age is revealed by the number of rattles. In truth, every time a snake sheds he adds another segment, and the majority of rattlers shed three times a year. Segments are often lost, however, in crawling over rocks and through brush, so dividing by three is not always a certain measure of age. Seventeen segments to a rattle have been recorded, although ten to thirteen is the average. With a mature snake the rattles cease to enlarge.

But to get back to "Spotty" who, after being measured, was wandering about among the things on my desk, exploring. He seemed to enjoy this, but as I reached to pick him up he valiantly but vainly tried to rattle his little "button." I had startled the little fellow and he struck at me. He has never done so since that time.

Foraging for my new pet was the next problem. I knew that he had had a full course meal of a large lizard before he left Florida, and that feeding him once a week would be enough. So I offered him a salamander. He refused to be interested. What he wanted was warm-blooded food, so the next item on his menu was a wood

mouse. "Spotty" paid little attention to the presence of this morsel in his cage until darkness came. Then he feasted, and ever since mice have been his main dish.

It soon became time for my little rattler to shed his skin. In late May I noted that his eyes were cloudy and his skin was losing its bright colors. That was the promise of the event to come. I had many visitors who wanted to be witnesses, but the days passed and the school term came to a close. Still "Spotty" kept his coat and he travelled home with me without having put on the proper entertainment. All this time I had been giving him evening exercise by taking him in my bare hands from his cage and letting him crawl about the room. Never once did he offer to strike, merely touching my fingers with his little forked tongue. We understood each other, you see.

Once home from school "Spotty" was installed in a luxurious home—no less than a glass show case provided with a floor of moss and pine needles, ledges and caves of rocks and a hollowed rock for a watering place. And the first evening in this new home he shed his skin. Perhaps it was a desire to live up to his splendid quarters, or, perhaps, he had not cared for the audience of school boys, with all their curiosity and turbulence.

THE AUTHOR AND "SPOTTY"
The reptile pet likes to coil in his owner's hand

"Spotty" is now a seventeen-inch rattlesnake. We are close friends and I have learned to trust and respect him. I believe that he reciprocates and that he will always be tame if not teased or angered. I never pick him up after a meal because poisonous snakes are nervous and easily frightened, and he would disgorge what he has eaten on account of the excitement. At other times, however, he will coil up happily in the palm of my hand, and when I put him back into his show case he will often try to climb back on my hand so that I have a hard time getting rid of him.

When food is put in the case, "Spotty" will coil on a shelving rock and wait patiently for a mouse to approach within striking distance. Then, with a buzz of his rattle, a slash of his little heart-shaped head, he strikes. He will remain on his rock to digest his meal, leaving only if he feels thirsty.

It may be gathered from this that I like snakes. Many people, I know, do not, probably because they have never gotten acquainted with any. While making poisonous snakes into pets may not generally be a wise hobby, the slaughter of valuable and beautiful harmless snakes goes on. We need a new deal for snakes, and giving one to a Pacific rattlesnake has been a happy experience for me.

A WINDOW SILL CATALPA

BY LAURENCE V. JOLLIFFE

SEVENTEEN years ago a catalpa seedling sprang up in the crevice under the sill of a second story window in the old stone house owned by Mr. C. F. Bailey, in Winchester, Virginia. It soon became firmly rooted in the thick mortar between the rocks of the wall and promptly sent its roots earthward in search of food and water.

Mr. Bailey, not thinking of the danger to the masonry, allowed the small tree to remain and became interested in its growth because it soon became quite a novelty and contributed more or less fame to the old house.

The tree, however, seems not to have appreciated his protective kindness but has returned evil for good by splitting the house from top to bottom, and the path of the root from the window to the ground can be easily traced by a constantly increasing split, already several inches wide in places, in the once sturdy wall.

HEATHER IS RICH IN HONEY YIELD IN NORTHWESTERN EUROPE WHERE IT COVERS VAST AREAS OF THE MOORS

IT IS NOT AN IMPORTANT HONEY SOURCE IN THIS COUNTRY, AND ITS YIELD PROVES HARD TO EXTRACT FOR USE

OUR HONEY PLANTS

SOME OF THE ROYALTY THAT SUPPLY THE BEES

BY JOHN H. LOVELL

A HONEY plant is a plant that secretes nectar freely and makes it easily available to honey-bees. To be entitled to recognition it must also be sufficiently common to be valuable to bee culture. Many believe that all flowers yield nectar, but destroy only a dozen plant species and commercial beekeeping would come to an end. More than three-fourths of the honey offered for sale in the big markets comes from white clover, alsike clover, white sweet clover and alfalfa. These are the royalty of the honey world, and among the many thousand species of flowering plants the honey plants number only a round two hundred.

Basswood, tulip-tree, sourwood, tupelo or gum-tree, orange, mesquite, sumac, and catsclaw are trees furnishing some of the honey supply. Shrubs which secrete a large amount of nectar include the mountain sages of California, the gallberry, sweet pepperbush, and raspberry. Of cultivated plants, exclusive of those grown for hay, cotton is the most important. It gets credit for furnishing four per cent of the total honey crop. Buckwheat contributes three per cent, and from a score or more of common weeds, such as goldenrod, aster, willow-herb, heartsease, Spanish needles, and partridge-pea, bees draw in varying degree. There are, too, many plants, which, although they are never a source of surplus honey, are helpful in building up the colonies of bees and in keeping them strong.

White sweet clover is the most important honey plant in the United States. Wherever there are soils containing lime, it is widely cultivated for hay and pasturage. It has been known to the world for thousands of years. In the Iliad we are told that the steeds of Menelaus and

SWEET PEPPERBUSH SECRETES HONEY FREELY

Below, the flower of basswood, source of a fine aromatic honey but much less found today with the cutting of the trees

Achilles were pastured on sweet clover. It has been planted on every continent. Its honey is white, or nearly white, with a flavor suggestive of vanilla. Extracted or in comb, it is high in quality. The period of nectar secretion is long and the yield is heavy if there is hot sultry weather with sufficient moisture in the ground.

Sweet clover has had a wonderful history on the limestone hills of northern Kentucky. Fifty years ago tobacco cultivation had resulted in the washing away of the fertile but shallow surface soil, leaving the eroded and unproductive fields. Farm after farm was abandoned and much of the population moved away. Then sweet clover was introduced, found a congenial home and spread in all directions. At first it was destroyed as a noxious weed, but it outran the farmer and overran the fields. Gradually the soil was renovated and became again productive, farmers returned and dairy farming and beekeeping began. From the first of June until late fall there is a continuous supply of bloom and nectar.

Alfalfa is an empire builder. It has been an important factor in the development of the West. Enriching the soil with nitrogen, it has been called "the greatest mortgage lifter ever discovered." When in full bloom the great fields of alfalfa, measured not by the acre but by the square mile, make a striking picture of purple coloring. Alfalfa honey is white to amber-colored with a pleasant minty flavor, but, with a few partial exceptions, the bloom yields nectar only west of the Missouri River.

White clover honey has a mild, delicious flavor, and not even the famous orange honey of Florida wears so well. While white clover grows in every state, as a source of honey it is most valuable in the "white clover belt," in Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa and Minnesota. But where the average summer temperature is very hot, or the soil does not contain lime, it yields little nectar.

Basswood has a wide distribution, and, excepting white clover, it at one time furnished more honey than any other plant in this country. But the trees have been so largely cut for timber that to-day little of the aromatic basswood honey reaches the wholesale markets, although large quantities are still gathered by the smaller apiaries. A cold and cloudy season reduces its yield, but, if the weather is hot and clear with a humid atmosphere, the

SNOW-ON-THE-MOUNTAIN IS A SOURCE OF HONEY
It secretes its nectar in extra-floral nectaries. While it has yielded in Texas, the colder climate in New England seems to discourage it as a honey producer

supply of nectar is so abundant that a single colony has been known to store three hundred pounds of honey in ten days.

Many may be surprised at the honey contribution of cotton, the plants of which produce a great abundance of large flowers. At first these are pure white or tinged with red, but on the second day change to a dark red. Nectaries occur both in the flowers and on the under side of the leaves. At times the leaf-nectaries secrete nectar so freely that it collects in large drops, and a bee can obtain a load in a single visit. Over much of its range cotton is a poor honey plant, but in the Black Prairie of eastern Texas it rises to the first rank and is the source of one-fifth of the entire crop of honey produced in that state. The honey is light in color and mild in flavor when thoroughly ripened.

COMMON MILKWEED
This honey source is common in Michigan, yielding a pale yellow honey with fruity flavor

Southern New York and northern Pennsylvania are famous for their great fields of buckwheat, the flowers of which secrete nectar only in the morning. During most of the afternoon the honey-bees remain idle in the hives. This enforced delay seems to make the bees exceedingly irritable, because, being anti-technocrats they do not favor shorter hours of work.

Buckwheat honey, when extracted, has a dark purplish color and looks much like New Orleans molasses.

In northwestern Florida along the Apalachicola River there are several hundred miles of swampland covered with a luxuriant growth of white and black tupelo. The small greenish flowers open in April, and are the source of a heavy, white honey, which, unlike most honey, always remains liquid. In the tide-water marshes on the southern coast of Florida there grows a large tree, resembling a scraggly old oak, called the black mangrove. No other tree in Florida yields nectar so copiously, and four hundred pounds of honey have been stored by one colony of bees in a single season.

In the great orange groves found in the foothills near Los Angeles there are seasons when the bloom secretes nectar so copiously that it drops upon the clothing of the pickers and pruners, and even the ground is dampened by the many falling drops. The honey is pale yellow in color and has a most delightful fragrance and flavor; but it crystallizes in a few months. A most widely-known honey is gathered from the mountain sages of California growing on the foothills of the coast ranges in the southern part of the state. The honey is water-white, thick and does not granulate. Once in every three or four years the entire crop is a failure.

There are other donors of honey—the lima bean, which flourishes in a strip of coast land in California; mesquite, which in Texas has usually two separate and distinct periods of blooming; sourwood, a large tree in the mountain forests of the southern states with small, urn-shaped flowers similar to those of the lily-of-the-valley, from which the nectar can be shaken out in a little shower of drops; tulip-tree, which has bell-shaped flowers two inches long marked with bright yellow spots. A single flower of tulip-tree has been said to yield a spoonful of nectar. We should be glad to visit the great swamps of pepperbush and the vast thickets of raspberry; to observe the partridge-pea, an annual vine with showy yellow flowers, covering thousands of acres in the South; and the blue vine in the damp river bottoms of southwestern Indiana twining around each cornstalk of the cast cornfields. But we must pass these by, as well as others, since their honey contribution, while interesting, is really only a tiny taste of the whole sweet crop.

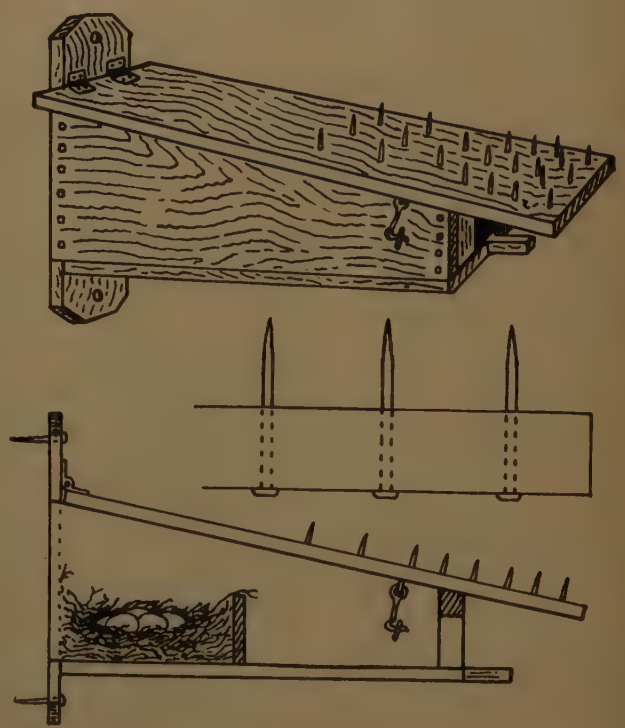
HELPING BLUEBIRDS

BY S. F. AARON

BLUEBIRDS find competition with the sparrows and starlings for nesting-places difficult nowadays. Hollow limbs, woodpecker holes in trees, telephone poles and other sites were formerly inhabited regularly each season by nesting bluebirds. Nesting boxes help solve their problems. If these are placed low in orchards and groves well away from houses both starlings and sparrows usually let them alone. The bluebirds can hold the fort against the foreigners, even to the extent of whipping half a dozen sparrows, but often desirable premises are occupied before the nesting bluebirds arrive.

Cats and squirrels also harass the bluebirds, the latter getting their eggs and young. Grimalkin awaits their emergence from nests, or thrusts in her long arm and claws and draws out the young or the mother bird.

It therefore becomes necessary to build the bluebird box—which may also suit the crested-flycatchers if the bluebirds pass it up—in a manner to forestall these common enemies. This is done by making the box long, as herewith shown, fully twelve inches inside measurement, about four inches wide, four inches high at the back and not more than two and one-half inches in front, with an entrance hole one and three-fourths or two inches, square or round. Midway of the length inside a cross partition, low enough to allow the birds to get over it, separates the vestibule from the rear nesting space.



Another important feature is the discourager on the hinged, very wide and overhanging roof. A series of not less than twenty sharp-pointed nails are driven through from beneath so as to form a phalanx of spikes that no quadruped will enjoy crawling over. This scheme has been found very successful. The hinging of the projecting roof permits necessary cleaning further to attract the birds when they arrive another season.

A TALE OF TRILOBITES

BY CARROLL LANE FENTON

PHOTOGRAPH BY C. E. RESSER

TWO TRILOBITES, NEOLENUS BY NAME
Relics of the Cambrian sea found embedded as fossils in a slab of shale in the Burgess Pass Quarry

WHEN life began, it appeared in the sea. Ages before there were trees or flowers, tiny plants lived in salt water. As ages passed they became larger and more varied, so that when the first animals came into being, they crawled and swam among green banks of algae.

Like the earliest plants, these animals were small—but they also began to grow. Some became worms and others shellfish, while less active sorts turned into corals and sponges. When they grew large enough to leave many fossils, they had formed most of the groups we now know and a number that have become extinct.

To see what these early creatures were like, let us visit an ancient sea. We shall find it high on a mountain side near the railroad town of Field, British Columbia, where a quarry was opened in 1909 by Dr. Charles D. Walcott of Washington. Discovering some rare specimens, he brought workmen and tools, and began to dig. In the fifteen summers of collecting that followed, he secured some of the most perfect fossils that anyone ever has found. Though only black films on slabs of dark shale, they show the shapes and internal organs of creatures that lived during Cambrian times, four hundred million years ago.

To collect at the Walcott quarry, we must camp a thousand feet down the mountain, where we have wood, shelter and a spring. Here we put up a small tent, cook lunch and watch the antics of ground squirrels that bob up from their holes to watch us, and to steal food even while we are eating. Then we climb to the quarry, and with hammer and chisel split the hard shale, searching each piece for fossils. When we find them, we wrap them carefully in paper and put them in a knapsack to be carried back to camp in the evening.

As we find fossil after fossil, we begin to picture this country as it was when these specimens were alive. Instead of mountains, we find a sea on which a few greenish weeds are drifting. Dropping down through the water, we find that our feet stand in soft, black mud. Thousands of little shells either lie still on it or wave gently on stalks of flesh. Here and there small cones shoot through the water, driven by fins that look like wings. Among the seaweeds, worms are crawling. Not earthworms or caterpillars, which cannot live in water, but beautiful sea worms dressed in shining scales and plumes of gold, silver or purple.

The biggest thing we see looks a bit like a lobster. Yet it has no claws or pincers, and when frightened it crawls and wriggles, as no lobster ever does. From its large head, shaped like a half moon, two solemn greenish eyes look upward, and a pair of long, jointed antennae wave. The flattened body is made up of jointed pieces or segments, which partly cover the many pairs of legs by means of which the creature is crawling. The tail is only a small, flat button which finishes the tapering body.

This queer fellow is a trilobite, whose special name is *Neolenus*. He belongs to a class from which crabs, lobsters and scorpions will develop; and though only a few inches long, he is the leading inhabitant of this Cambrian sea. Only one of his neighbors is able to harm him—and this is a crab-like second cousin whose pincers can break even a trilobite's shell.

Neolenus has just the habits we expect from his clumsy, flattened form. When very young, he floats in the water; as he grows he settles down to life on the sea floor, where he eats defenceless or dead bodies that he finds while crawling about on the mud. His antennae help him discover such food, and his many legs take him to it promptly. Around some piles of rubbish a dozen trilobites are

feeding, each busily eating all that he can take away from his neighbors.

Like his descendent, the crayfish, *Neolenus* grows only now and then. Month after month he crawls about in a hard, shiny shell. One day, that shell breaks along the head—and with much wriggling and twisting, *Neolenus* sheds it. Each twist removes more of the hard cover, and at last he comes out as a larger but soft-shelled trilobite, which must hide among the seaweeds and sponges until his coat has time to harden.

As he crawls about on the muddy bottom, *Neolenus* meets a number of relatives. The commonest are small, smooth creatures less than half an inch in length, with heads no larger than their tails and only two body segments. Some have tiny eyes; others are quite blind, and spend their lives burrowing among rubbish or plowing through mud for something to eat. They are the smallest and most specialized of their kind—and their differences from *Neolenus* show how much trilobites had varied (or evolved) before they grew the hard shells which today we find and call fossils.

WHAT A TRILOBITE LOOKED LIKE
This one dug into the mud or lay with his mouth on the sea floor waiting for food to drift by

Have we seen enough of these creatures? Then let's look at other sea beds, or formations, to see how great the trilobites became. In late Cambrian sandstones of Minnesota, there are heads and tails of kinds much larger than *Neolenus,* with habits like those of the modern king-crab, so common along the Atlantic sea coast. They crawled and fed in sandy shallows, and when they had nothing better to do, lay partly buried by the sand. When they died, and the sand hardened to stone, their shells left prints in the rock before they decayed. Those prints also are fossils, although they tell less about the creatures that made them than do the remains at Dr. Walcott's quarry.

During the Ordovician period, trilobites became even more varied. Though named because its rocks were found in the country of a tribe called Ordovices by the Romans, the Ordovician seas covered a great deal of North America. In the shales and limestones that they left, trilobites are common; and so are the shells of less active animals whose ancestors lay on the Cambrian muds. These Ordovician descendants had grown much larger, with thick shells like those of clams. We call them brachiopods or "lamp shells," and find them in abundance when we climb the hills above Cincinnati, or break layers of shale and limestone beside some of the creeks in eastern New York.

Among the brachiopods are some very large trilobites, as well as others that were small and thick shelled. When danger threatened they rolled into balls, their bodies encased in ribbed armor that discouraged every enemy.

Most large trilobites were smooth, yet one which lived in Devonian seas developed a marvelous set of spines. His large head bore knobs, points and spikes; more spikes stuck upward from his back, while his tail was set with knobs, spines and hooks. A perfect porcupine of the sea, he commanded a clear right-of-way the moment his bristling shell appeared. Other denizens of the ancient deep left him severely alone.

Smaller species also shared this development of prickly armor. Indeed, some were little more than clusters of spines projecting from thin, delicate bodies. Probably they drifted about, coming to rest where they chanced to catch in drifting fronds of seaweeds. Others had no spines at all: with smooth bodies and huge compound eyes, they swam forth to hunt at night, when their enemies no longer could see, but hid themselves during the day. There are crustaceans which live like that today—and crustaceans are cousins of trilobites.

Some smooth forms lived more simply than that. Digging down with their spade-shaped tails, they buried most of their bodies in mud and lay with their mouths just at the surface, waiting for something to eat. Unwilling to burrow or to hunt, they took just what drifted by. Theirs was the truly simple life, with nothing risked, little lost, and leisure through every day and year.

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There appears to have been much interest in the article on Spring, by Charles Fitzhugh Talman in our April issue, and the facts and fallacies about it. We have asked Mr. Talman to write similar articles about the other three seasons. That on Summer will appear in the July issue

COURTESY PETER HENDERSON AND COMPANY

DOUBLE PEARL, ONE OF THE TUBEROSES
This is a bulbous plant that is fast winning its way back to favor with the gardener who appreciates the value of white blooms in his garden

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MAY BULBS FOR SUMMER BLOOM

SOME LOVELY PLANTS OVERLOOKED BY THE MAJORITY OF GARDENERS

BY F. F. ROCKWELL

WHY is it that so many gardeners are content, season after season, to get along with only two or three of the many available and easily grown summer-flowering bulbs?

One reason is that we often garden—as we do other things—in ruts. It is so much less trouble just to keep on doing what one has done before, or to duplicate what the neighbors are doing! Then, too, many of the good summer bulbs are never brought prominently to our attention.

It is unfortunate, from the gardener's point of view, that flowers and plants cannot be awarded space in seed catalogs in proportion to their real worth and desirability, instead of their commercial possibilities. Of course it can be argued that a plant's real worth first creates the popular demand for it, and that this in turn determines its commercial value. This is true only to a limited extent, and there are many excellent flowers which remain little known, until, for one reason or another, they are suddenly "discovered" by the gardening public. There are many to which this has not yet happened.

When summer-flowering bulbs are mentioned, one of course thinks first of gladiolus, dahlias and cannas. This is as it should be because they are certainly the more important ones. Nevertheless, in the present discussion we will leave them until later, because to most gardeners they are much better known than are a number of other desirable sorts.

Of these less well known bulbs which can be planted now, some are hardy like daffodils, and, once set out will grow on, increasing in beauty season after season with little further attention. Others are not hardy, and, like dahlias or gladiolus, must be taken up in the fall, kept over winter and replanted in the spring. Still others are on the borderline between these two, being "hardy" in moderate

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THE PERUVIAN DAFFODIL RECOMMENDS ITSELF
It has large, fragrant, lily-like flowers, with graceful recurving petals of the purest white. Its leaves are notably decorative

climates—roughly, south of the Mason and Dixon line—and somewhat farther north if given careful winter protection. Usually, however, it is best not to take a chance with them because there is always the risk that a winter like the past one will come along.

One of these little known half-hardies is the Jacobaean lily, *Sprekelia formosissima,* a brilliant deep crimson cousin of the amaryllis hailing from Mexico. Although generally thought of as a greenhouse plant, it has a value for the outdoor garden because it is one of the quickest to come into bloom after the bulb is put in the ground; planted in May, it will flower in June.

While this member of the amaryllis group is well worth having, there is another which I consider one of the most neglected—in proportion to its true merit—of all bulbous flowers, and which I can recommend without reservation for any garden. This is the so-called "hardy amaryllis" or Japanese wonder lily, *Lycoris squamigera,* formerly listed as *Amaryllis halli.* Its narrow, long and graceful leaves are produced in spring and die down by mid-summer, to be followed in late July or August by suddenly thrown-up flower stalks about a foot and a half tall, each bearing a cluster of fragrant, lovely, lavender-pink lily-like flowers, which are infinitely more graceful and artistically proportioned than any of the well-known amaryllis hybrids. They have all the charm of real lilies, but because the stems are bare the bulbs should be planted among low-growing perennials, or with ferns. With the latter these make a particularly pleasing combination, and the wonder lily will stand a considerable amount of shade. The bulbs, which are hardy as far north as Boston, increase slowly without replanting and in time form imposing clumps or colonies. I have never known any insect or disease to bother this lovely flower.

A group of highly desirable white flowers for mid-summer and late summer are the cape hyacinth, the Peruvian daffodil and the tuberoses. In our present day insistence on more and more color in the garden we are likely to overlook white flowers, losing thereby not merely their own intrinsic loveliness, but the great value which they possess as a means, by contrast, of making other colors more effective. There are, however, still those who can find beauty in a landscape, or a plant grouping, which is not ablaze with color; who may even prefer—at least in some corners of their gardens—the quiet and restful atmosphere produced by white and green alone. They will take a great delight in planting these three where they will have a shadowy background of shrubs, or better still of evergreens, to silhouette their chaste charms.

COURTESY PETER HENDERSON AND COMPANY

GAY AND GRACEFUL HYBRID MONTBRETIAS

While these bulbous plants somewhat resemble gladiolus in appearance, the colors are more brilliant. They are ideal for the late fall garden

The Peruvian daffodil, *Ismene calathina,* has large, fragrant, lily-like flowers, with gracefully recurving petals of the purest white. They are borne on stems to two feet in height rising from broad, decorative leaves. The large fleshy bulbs should not be set out until the ground has thoroughly warmed up, and must be winter-stored in a dry place, somewhat warmer than is required for gladiolus bulbs.

The cape or summer hyacinth, *Hyacinthus candicans,* is a grand flower, throwing up a succession of spikes, four feet or more in height, each of which bears a score or more of pendant, pure white bells. Few things are so effective against a green background. The summer hyacinth is much hardier than the Peruvian daffodil, with ordinary protection, being safely hardy to northern New Jersey. (Incidentally, both the "hyacinth" and the "daffodil" are misleading terms so far as the general appearance of these plants go. They have sufficient beauty to stand on their own merits, and probably would have got on better without having had these second-hand names attached to them.)

The third member of this white group, the tuberose, was once very popular but gradually fell out of favor. It really is an excellent flower and is now winning its way back. Although rather heavy-scented for use in a room, its fragrance in the garden is surely desirable. Personally, I prefer the single-flowered Mexican everblooming to the old double pearl. The former begins flowering in July and

COURTESY OF W. E. MARSHALL

THE SPOTTED LEAF CALLA LILY

Callas are among the several "tender" bulbs which may be used for summer effects outdoors

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continues for a long time. Either one is easily grown. They belong to the not-quite-hardy group and should be taken up and stored for winter after frost has killed the tops.

A flower which has recently come into more prominence than it formerly enjoyed is the montbretia. The corms of this flower, a near relative of the gladiolus, are much smaller than those of the latter. They are considerably hardier, and with protection will usually over-winter safely outdoors as far north as Philadelphia. Many gardeners, however, prefer to take up the bulbs each fall, as with gladiolus. They can be stored in a near-freezing temperature, but should be packed in sand or peat-moss to prevent shriveling. They require more care in this respect than gladiolus corms. Montbretia bulbs started in pots are usually available for late planting. If bulbs are bought, soak them for a day or two before planting if they seem at all dried out.

The new giant hybrid montbretias mark a considerable advance in size in this desirable flower. Some of the new sorts, such as His Majesty, Fiery Cross and Indian Chief have individual flowers two or three inches across. A strong plant will throw in succession several of its graceful, wiry flowering stalks, two to three feet tall, thus giving a flowering season much longer than that of gladiolus. While the montbretias somewhat resemble "glads" in general appearance, the colors are more brilliant, and the rich orange, gold, crimson and apricot shades for which they are noted make them ideal for the late fall garden, in groups in the perennial border and for cutting.

COURTESY OF OREGON BULB FARMS

Another extremely brilliant summer-flowering bulb, to be handled in much the same way as the gladiolus, is the tigerflower or shellflower, *Tigridia pavonia.* A native of Mexico, it is somewhat less hardy than the gladiolus but easily kept over winter. It is also readily grown from seed. Bulbs planted in May will begin blooming in July and continue to flower for a long time. About a foot and a half in height, it makes a good plant to place among early summer flowering perennials in the middle ground of the hardy border, where, later in the season, its crimson blossoms with their contrasting yellow mottled centers, lend a flame of color.

One of the most important of all summer-blooming bulbs and certainly the most varied of them all in form and color, is the tuberous-rooted begonia. It is hard to say just why this wonderfully beautiful and extraordinarily varied flower has never become more widely

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HIS MAJESTY—ONE OF THE NEW MONTBRETIAS

A flaming spire of scarlet and old gold, ideal in the autumn garden

popular in the United States. In some sections, undoubtedly, there are greater extremes of heat than it likes, but more probably its use has remained limited because its cultural requirements, while simple, are quite different from those of all the other bulbs we have been discussing. It likes good underdrainage, but a soil exceptionally rich in humus. Leafmold, or peat moss, and sand, enriched with decayed cow manure (or one of the several prepared dehydrated forms of cow manure now on the market) dug to a depth of six inches or so into the bed where tuberous-rooted begonias are to be planted, will provide the right growing conditions. They are the most brilliantly colored of all plants which will thrive in a fairly shaded location, and flower continuously from mid-summer until frost destroys them.

COURTESY OF PETER HENDERSON

THE HARDY AMARYLLIS
Whose lily-like flower stalks add charm to the mid-summer garden

There are several distinct types offered. The single and the frilled types, which may be had in mixture or in separate colors of orange, yellow, pink, scarlet or white, are the most effective for borders and beds to be seen at a distance. The huge flowers, in pure brilliant colors, are four to six inches in diameter. The double and crested types, which include flower-forms in a most astonishing range, are effective in more intimate beds, in porch boxes and in pots for wall or terrace decoration. The hanging and trailing types are excellent for porch or window boxes, especially where there is a good deal of shade.

The tubers, which are fleshy, should not be set out of doors until all danger of frost is past. A better method is to start them three or four weeks before warm settled weather may be expected. Place the tubers either individually in pots, or a couple of inches apart each way in flats, and start indoors or in a warm frame. Use a leafmold or peat moss compost, and set the tubers, concave side up, just flush with the surface of the soil. They start quickly, and in a few weeks will make strong plants, with plenty of fibrous roots which transplant readily. Give plenty of water, especially during hot weather. Take the tubers up as soon as the tops have been frosted; dry for a couple of weeks in a frost proof place; store in peat moss for the winter, keeping in a temperature above forty degrees.

Lately there has been introduced a new and much hardier tuberous-rooted begonia, Evansiana, which, with protection, is hardy as far north as Philadelphia. Its pink flowers are produced in profusion during September and October, and it attains a height of two feet or more.

A number of the "tender" bulbs, usually considered greenhouse plants, give excellent results for temporary effects outdoors. As many of these are of tropical character, one should be careful not to mix them indiscriminately with other types among which they will seem quite out of place. Calla lilies, especially the yellow varieties, fancy-leaved caladiums, gloxinias, are representatives of this class. They are best set out as growing plants. Splendid tropical foliage effects may be had with the large-leaved caladium or "Elephant's-ears," and with the palm-like amorphophallus.

As to the universally known summer-flowering bulbs, gladiolus, dahlias, and cannas, there is not space here for a discussion of varieties, but a few words as to use may be helpful even to some who are familiar with them.

In most gardens, for instance, the season of gladiolus bloom is a short one. This is wholly unnecessary. Glads can be planted any time from early April until after July first. By making three or more plantings, and using some early, medium and late varieties each time, it is easy to have them almost continuously from midsummer until frost.

Dahlias too can be planted late. Often those grown especially for exhibition are not set out until well along in June. No matter how many of the big "exhibition" varieties one may grow, there should always be a supply of singles, pompons, and the new miniature decorative type —such as Little Jewel and Goldina—for autumn cutting; and some of the ornamental grasses to go with them.

As to cannas—well, there is no other summer "bulb" which will bloom so continuously, for so long a time, and grow with such vigor and certainty under even semi-neglect. For a quick-growing temporary hedge or a background, or for masses of color at a distance, they are quite unsurpassed. And a number of the newer sorts are of really lovely color, and worthy of much more attention than they have recently been given by most of the growers.

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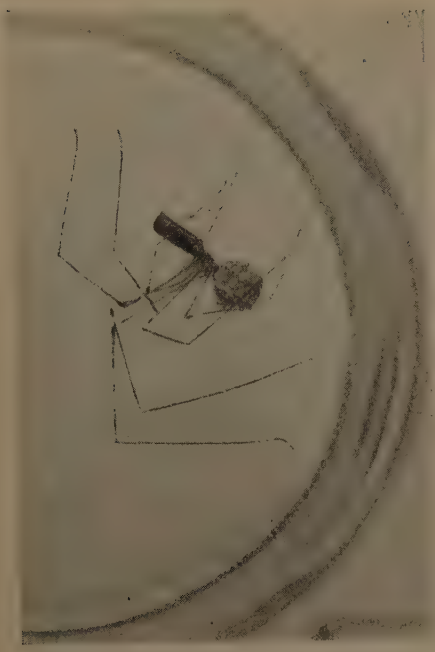
Increasing in popularity, the rock garden is becoming a matter of much discussion wherever gardeners get together. One of the secrets of success with this phase of the garden plan lies in selection of plants for a succession of bloom. This is the subject of a practical article by John H. Bain in the June issue of Nature Magazine. The author indicates to rock gardeners many plants that are overlooked and which will serve to make the rockery a place of continuous charm.



THE WORLD'S FIRST "LOOPER"

BY GEORGE ELWOOD JENKS

VIEWS OF PHOLCUS

At the left the devoted mother spider carrying the precious eggs around in her mouth. This she does for two weeks, not even laying them down to eat. At the right is Pholcus all ready to do his "loop the loop" with amazing dexterity

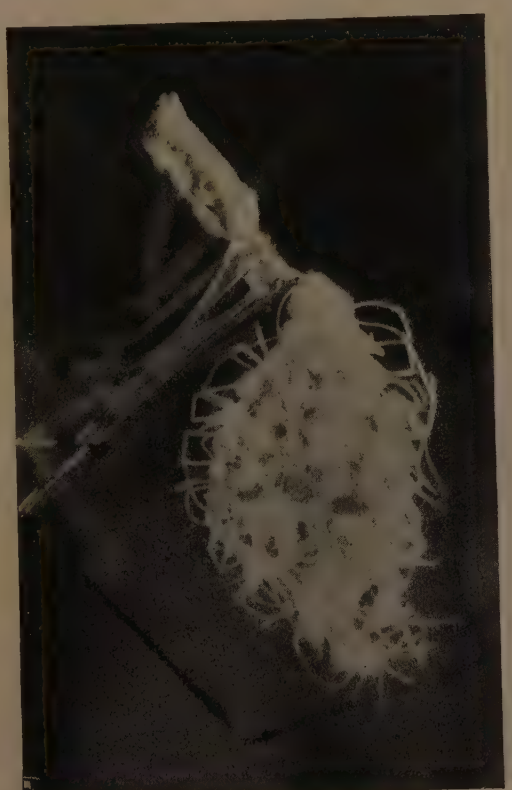
IT IS only a few short years since "stunting" to dodge the bullets of a hostile flier became a part of the training of every army aviator. But a million years ago, more or less, when the great dinosaurs were roaming the earth, timid little spiders were skilfully and effectively "looping the loop" to escape their enemies!

The *Pholcus phalangiodes* is quite common, but it is little known because it is usually mistaken for the "harvestman" or "daddy-long-legs"—yet it is easy to identify the little "flyer." Just take a stick and poke it gently towards him as he hangs upside down in his straggly web in the corner of garage, cellar, or out-building. If he quickly whirls into a series of dizzy loops so rapid that all you can see is a blurry, circular shadow—he is a *Pholcus.*

The mechanics of his loop are perfect in their precision, and he uses the same principle of the inertia of motion as that applied by the small boy who stands in a swing and "pumps" to get it started. First one knee is raised, then the next, and the next—and so on around the ring of knees, the long glassy legs working like piston rods. The body, hanging below the center of this circular wave of motion, follows in a smaller orbit which increases in size and speed as the churning pistons above move faster and faster. The loose strands of the web respond to the pull of the feet, and the orbit of the body widens. So we learn of one use for the elongated legs.

Quickly the outlines of the spider's body disappear and all that is visible is the blurry ellipse. Obviously it would be difficult if not impossible for a hungry bird or an enemy wasp to make a "hit." So his swinging loop accomplishes exactly the same purpose as the erratic stunts of a human aviator.

And the domestic life of the *Pholcus* is quite admirable. Unlike many spider brides, Mrs. Pholcus does not eat her husband as soon as the honeymoon is over. Also she is a devoted and self-sacrificing mother.



LITTLE "PHOLCUSSES"

A cluster of newly-hatched spiders warming up their motors

For two weeks or more she carries the egg sac in her mouth, not even laying it down to eat. When the babies hatch she holds the squirming cluster for several hours longer, while the glassy, transparent little mites get their bearings and limber up their machinery. Then, at the proper time, she shakes them loose one by one. The little "pholcusses" do not fall far, but cling to the strands of the home web and are soon clambering around like monkeys in a tree-top.

There they stay for weeks, close to mother's apronstrings, shedding their cellophane-like skins as they outgrow them, and trying hard to learn to do the swinging loop—"just like mother used to make." Like children of circus acrobats, they are born to the business and learn quickly.

THE MOUNT OF OLIVES AT JERUSALEM

BY WILL C. BARNES

We sit on the balcony of the beautiful King David Hotel in Jerusalem. Wonderful views of terraced hills spread out before us—strange, oriental scenes. Below in the valley flows the brook Kedron—or Cedron as the Bible spells it. Once a clear running stream, today it is a dry rocky ravine, its upper reaches closed by the encroaching city. To the east stands a tall spire outlined boldly against the blue of a Syrian sky.

"The Mount of Olives, sir," the rosy-cheeked Swiss maid observes. "There's a fine church in the Garden of Gethsemane—you will visit it. No?"

The road to the historic spot winds through narrow lanes; on each side high stone walls. It leads through Bethany where Mary and Martha saw their brother Lazarus raised from the dead. From it one gets a fine view of the Mount and Church. One must read his Bible to locate these places in his mind. John says: "Jesus went forth with his disciples over the brook Cedron . . . into the Mount of Olives where there was a garden."

A heavy wooden door is set in the wall, an electric push button at one side. The door is opened by a dark-eyed boy to whom our guide hands the small admission fee. Garden and Church are completely enclosed by this wall. The world seems shut out from the place. Inside the church is a dark rock about three feet high and four or five feet long. "The 'Rock of Agony' from which the Saviour is said to have ascended to Heaven," the guide explains. Easily he quotes; from the New Testament: "And He came out and went, as was His wont, to the Mount of Olives . . . and kneeled down and prayed. And, being in agony, He prayed more earnestly."

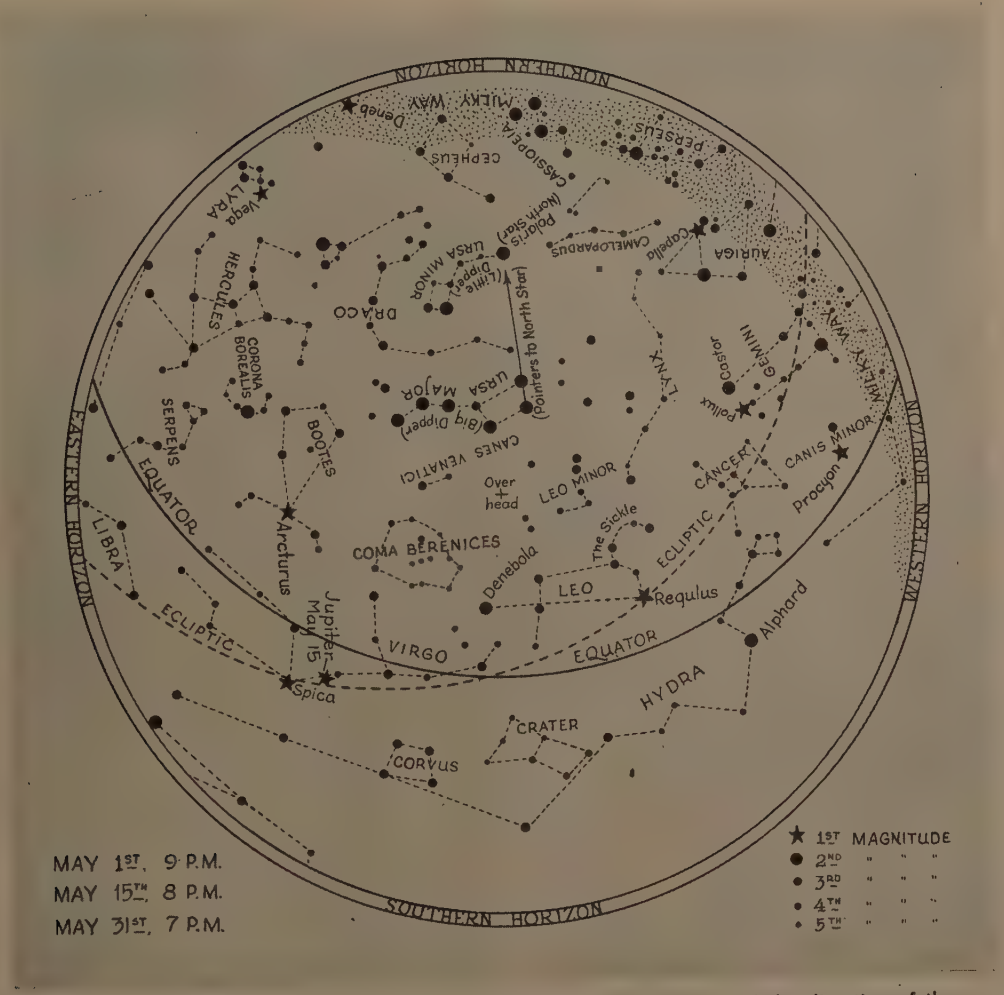
IN THE GARDEN OF GETHSEMANE

Above a gnarled and ancient olive tree under which, perhaps, the Saviour sat. At the left the gardens rich with lovely and colorful bloom

Constantly, this rock is surrounded by kneeling men and women praying quietly before it. Its surface is worn smooth and shiny from the caressing touch of millions of hands that have stroked it and lips that have kissed it in the centuries past. The reverence of these simple worshippers is wonderfully impressive.

In the Garden are seven or eight huge olive trees with gnarled, twisted trunks many feet in circumference. Some are mere shells, some still bearing fruit. In all this wide world there can be no living trees as venerable as these. From their looks they may well be the identical trees under which the Saviour sat and talked to his disciples. A fine middle-aged Franciscan Monk, his coarse brown serge gown touching his sandaled feet, showed us around. He, with others of his order, keeps the Garden full of flowers and watches over the old trees with tender solicitude. Cordial and friendly he posed several times for his picture. At the gate he gave each lady a bunch of fragrant violets and hyssop leaves picked under her eyes. The hyssop, while fragrant, exuded a sticky disagreeable sap.

Again the guide quoted: "Purge me with Hyssop and I shall be clean." And the ladies, their gloves sticky and stained with hyssop sap, wondered.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

SOME CURIOSITIES OF THE SKY

BY ISABEL M. LEWIS

IN THE northern part of the constellation of Virgo, east of Denebola in Leo and still farther north in Coma Berenices is one of the most remarkable regions in the heavens. This is the vicinity of the north pole of the Galaxy, which is located near the northern boundary of Coma Berenices. Here are to be found literally hundreds of faint, hazy, little patches of light which are among the most distant objects in the heavens, as well as the largest and the most rapidly moving. They are the much-talked-of "island universes," or extra-galactic nebulae. More than three hundred of them have been detected upon a single photographic plate covering an area less than twice that covered by the full moon. Their form is generally spiral and flattened; some are viewed edgewise; others lie at right angles to the line of sight. They vary in appearance from masses of hazy nebulosity to clearly-defined spirals whose arms consist of countless individual stars more or less intermingled with nebulosity.

Although these objects exist by the hundreds of thousands in all parts of space exterior to our own Milky Way or Galaxy, which is itself considered to be a great island universe, they occur in greatest numbers in this region, and practically all of them that have been studied in detail have been found to be receding at tremendously high velocities that increase with the distance of the object. The nearest of these universes, which are more than a million light years distant, are receding from us at the rate of about 300 miles per second; the most distant, which are 150 million light years or more from the earth, are speeding through space at the rate of *1200 miles per second*.

The largest, nearest and brightest of all the island universes is the Great Nebula in Andromeda which may be detected even with the naked eye as a hazy patch of light, and which appears on the photographic plate as one of the most beautiful spiral nebulae in the heavens. The distance of the Great Andromeda Nebula is estimated to be over 800,000 light years.

In Cancer, which is one of the smallest and least conspicuous of the zodiacal constellations, and which may

now be seen in the western evening sky, there is a large cluster rich in stars that are just beyond visibility to the naked eye. This is known as Praesepe, The Bee-hive, and also as the The Manger, the two stars of fourth magnitude to either side of it being known as Aselli, The Asses. Praesepe is visible to unaided vision as a misty patch of light. It is a fine object when viewed with a pair of binoculars, or a small telescope. It is one of the moving clusters in which all the members, like the group in Ursa Major, or the Pleiades, are journeying through space together.

Coma Berenices, which lies directly east of Leo, consists of a large number of stars which lie just beyond the reach of the naked eye. This gives the constellation the filmy or veil-like appearance which won it the name of Hair of Berenices. Many of the stars in Coma also belong to a large moving cluster. The Praesepe cluster is about 600 light years distant from the solar system, the Coma cluster about 300 light years.

In that beautiful little semicircle of stars which bears the name of Corona Borealis, The Northern Crown, there is a most peculiar star which bears the name of R Coronae. At present it is being kept under close scrutiny by the Society of Variable Star Observers chiefly for the reason that it has done nothing out of the ordinary for such a long time that something is now expected of it. It seems that R Coronae is a long period variable star that is very irregular in its light fluctuations. For years it may remain without a flicker of variability as a star of the five and one-half magnitude just within the limit of unaided vision; then unexpectedly it will begin to fluctuate in brightness for some months and finally drop suddenly several degrees in magnitude. After an interval that may last for several years it will increase again to its former brightness. As R Coronae has remained a well-behaved star for more than ten years now it would not be surprising if a change in its brightness should take place at almost any time. When that happens the Variable Star Observers want to know it because they want to solve the puzzle of its peculiar behavior and that of some other stars that show similar variability. So a close watch is being kept of this star. If one wishes to take a look at R Coronae it may be seen, without optical aid if still behaving as a normal star, within the semicircle of stars in Corona at the vertex of a small equilateral triangle which it forms with the two stars of fourth magnitude, Delta and Epsilon, which lie farthest east in the semicircle. Directly below Epsilon lies a faint telescopic star, T Coronae, that in 1866 became a Nova, and was known as "The Blaze Star" because it suddenly flashed forth as a star of second magnitude. Its splendor lasted scarcely a week. In less than a month it was again a star of the ninth magnitude and so it has remained ever since with but slight variations.

Omicron Ceti, better known as Mira, The Wonderful, is another remarkable long period variable star that shows a peculiar variability of light. Usually at its maximum brightness this star is of the third or fourth magnitude, but on certain occasions it has become as bright as a second magnitude star, while at minimum it drops to the ninth magnitude. The period of its light changes average about 330 days, although it varies considerably. A giant, red star with a diameter of approximately 260,000,000 miles, it has been found recently to have a faint, white, dwarf companion, which may possibly have something to do with its light changes.

In the exquisite little constellation of Lyra, which is now appearing in the northeast, is that curious formation known as the Ring Nebula consisting of a bright nebulous ring surrounding a faint central star. It belongs to a class of objects known as planetary nebulae because of their resemblance, in general, to faint planetary disks. There are about one hundred and fifty of them known in all. The central stars are bluer than any other known stars and they are excessively hot bodies. It is believed that it is their radiations that excite their nebular surroundings to luminescence. The gaseous envelope appears to take the form of a thin, transparent, luminous shell. Certain Novas have been observed to assume, in later stages, the form of planetary nebulae. All of the planetaries are objects of great size, averaging several hundred times greater than the solar system in diameter. The form of the Ring Nebula can be distinguished even in a two and one-half inch telescope, but it takes a powerful reflector and long photographic exposure to bring out its remarkable beauty and detail of structure.

A most interesting characteristic of many double stars is their vivid contrast of color. There are many such stellar gems in the heavens. Frequently the two components of a double star are stars of different types and colors. One of the most beautiful doubles of the northern heavens is the star Gamma Leonis which is in the Sickle in Leo. Directly above Regulus, the first magnitude star at the end of the handle of the Sickle, lies Eta, and Gamma lies next to Eta. It is after Regulus the brightest star in the Sickle. In a small telescope it is a beautiful object. The brighter star is a golden-yellow of two and one-half magnitude. Its companion is a star of the fourth magnitude, distant from it only four seconds of arc, and has been described as a greenish-red. Sir William Herschel, strange to say, described both stars as white. The two stars are in mutual revolution in a period of 400 years.

Jupiter is the only planet visible in the evening sky this month. On May 15 it will be high in the southeast at sunset. It is always one of the most fascinating objects to observe telescopically because of its ever changing belts and other surface markings and the phenomena of its satellites. It is now in fine position for observation.

Mercury will be a morning star until May 13, when it comes into superior conjunction with the sun. Although in the evening sky for the remainder of the month it will be too close to the sun to be seen.

Saturn will be ninety degrees west of the sun on May 19. It is a fine morning star in the southeast. Venus is also a beautiful morning star this month. On May 15 it will be about twenty degrees above the eastern horizon at sunrise.

Mars is close to the sun in the morning sky and cannot be seen this month. But now is the time to polish up the telescope for spring and summer work.

NATURE RAMBLES WITH UNCLE DICK

A DEPARTMENT FOR THE YOUNG FOLKS

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POPPIE

BY
LILLIE C. HUMMEL

OGGIE AND POPPIE—ONE KEEPS A BIRD HAVEN AND THE OTHER FEELS THAT HE IS THE KING OF IT

THIS is a story about Poppie, the ram who lives across the road in Oggie's lovely bird haven. Do you know what a bird haven is? Well, if you do not know, you might call it a paradise for birds.

In Oggie's bird haven there are all kinds of our feathered friends. Some of them live in large cages with shrubs planted in them. Others, such as the turkeys, guinea hens, the ducks and the two beautiful, snowy-white swans, have their entire freedom.

There are two kinds of ducks on Oggie's pond. Oh yes, there is a beautiful pond in Oggie's bird haven. Pond lilies grow in it and gold fish swim around in it. But unless you look for them you cannot always see the gold fish. Oggie has both mallard ducks and wood ducks. They belong to the wild duck families. The male mallard ducks have gorgeous coloring—green heads and white and gray bodies. When they fly to my lily pond across the road, their flight is a beautiful thing to see. The wood ducks are black and have a helmet-shaped head and a bright blue spot on each wing. The female mallard ducks are just plain brown—not at all so pretty as the males.

The grouse, the pheasants and the quail live in cages which have little houses attached to them in the rear of their cages where they mate and lay eggs.

There is also a flock of sheep and a ram in Oggie's paradise for birds. You see it is quite a large piece of land on which Oggie has built this beautiful home for birds. The sheep are there to keep the underbrush from growing up. Sheep love to be in a nice home like that, too. Poppie seems to think that he is king of them all. He is the whitest, softest, wooliest ram you ever saw. He has a soft pink mouth just like velvet. Of course, being a ram, he has horns. They are great, curving, good-looking horns that completely hide his little white ears. Poppie follows Oggie around just like a dog follows his master. Poppie is really a very majestic looking ram!

The reason that Poppie and his flock of sheep live in that beautiful spot—aside from keeping the underbrush from growing up—is because Oggie loves all kinds of living things.

Poppie seems to know that he is the most important one in all the place. Whenever Oggie feeds his ducks, his quail, his guinea hens, his golden pheasants, his silver pheasants, his grouse, his turkeys, and his two beautiful

THE TWO SNOWY-WHITE SWANS AND SOME OF THE DUCKS ON THE LITTLE POND THAT IS A PART OF OGGIE'S BEAUTIFUL BIRD HAVEN

swans, Poppie has to be locked up in the feed-house or else he would eat up all the food. But he doesn't seem to mind that at all. When the feeding is over, Oggie opens the door of the feed-house and Poppie steps out like a king and does not seem at all peeved.

On a beautiful Sunday in September, Oggie brought Poppie and his flock over on my lawn to nibble all the grass they wanted to eat. They looked pretty there, scattered all over my lawn, nibbling away. Poppie nibbled for a while but not with the rest of the flock. He followed Oggie around, nibbling as he went. I was watching them. They made a pretty picture on the edge of the lawn near the lily pond.

A CLOSE-UP PICTURE OF POPPIE WITH HIS SPLENDID HORNS, AND, BELOW, SOME OF THE SHEEP THAT OGGIE HAS TO KEEP DOWN THE UNDERBRUSH ON HIS BIRD HAVEN. THEY ARE FRIENDS OF THE SWANS

The telephone rang. One of my neighbors wanted to talk to Oggie about a wounded crane. So I called Oggie to the phone. Poppie walked along with him, right up the ten little cement steps that lead to my screened porch. I really believe Poppie would have walked right into the house if Oggie had not shut the screen door in his face. Oggie told Poppie to wait for him. And Poppie waited.

Oggie went to see the wounded crane but before he went he took Poppie back into his home in the beautiful bird haven. If he had not done so, Poppie would have followed him. All the rest of the sheep just kept on grazing in the sun and didn't even know that Oggie had left them.

It was a long walk to the neighbor's house and it took a long time to make a splint for the wounded wing of the crane. By the time Oggie came back to his bird haven it was noon. He was tired from his long walk, and the sun was hot, so he threw himself down in a shady spot and thought he would rest. He closed his eyes and thought:

"How wonderful it is to lie here with my quail and my grouse and my pheasants and my guinea hens and my swans and my turkeys and my ducks all around me. Only the sheep are missing—all except Poppie. He's around here somewhere. He didn't see me come back—I fooled him—climbed over the fence. Wonder—where—he is? Gee! But—I'm—tired! So tired!—How—good—it—feels to lie—here—so nice—and—cool—in the—shade.—But why—should—it—feel—so—warm—on—my—back?—Maybe—the—sun.

And then Oggie went fast asleep.

When he awoke there was Poppie close beside him—cuddled on his back—just close as could be.

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CLOUDY VENUS

By WILLIAM H. WOODIN, 3rd (Age 8)

VENUS is one of the most interesting planets. You can see it in the evening down in the West. It is quite low down to the horizon, and it looks like the brightest star. Venus has very thick atmosphere. In fact it is so thick that the planet itself cannot even be seen through a telescope. The only way we can find out things about Venus is by using a spectroscope. In 1933 some astronomers,

by the use of a spectroscope, found that the planet is surrounded by a certain yellowish light which told them that the surface of Venus is partly covered by carbon dioxide gas. Since the planet has this gas there might be life as we know it. But people are not sure about life on Venus, because they haven't yet found oxygen there.

Venus is 15,000,000 miles from the Earth, 67,200,000 miles from the Sun, and 7,701 miles in diameter. Until this discovery of carbon dioxide gas on the planet, astronomers thought that its surface was covered by a desert of sunbaked rock, and that might be true. Venus is very hard to see, because when it is closest to us, it looks (through a telescope) like a cloudy little crescent moon. When the planet is farthest from the Earth it looks like a full round circle. Looking at the stars and planets is fun if you know which is which.

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CUBS AND VITAMINS

By UNCLE DICK

THESE three little lion cubs live in Bombay, India. Their home is in the zoo. They were four months old when this picture was taken. The head of the zoo says that they are the healthiest little lions he ever had in his care. The reason, it is found, is because they took their vitamins regularly. You have heard about vitamins. They are qualities found in different kinds of food and in cod liver oil, haliver oil and other things. When the person needs more vitamins than he gets from food he takes these other things. Sometimes he doesn't like to take them, but these little cubs did not object. They took their vitamins regularly and before long they were full of "pep." In the next cage an old lion was feeling poorly and the zoo keeper began feeding him the vitamin-filled oil. Soon he had almost as much pep as his younger neighbors. So don't forget your vitamins and let any lion cubs get ahead of you. Surely you would like to be as healthy as a lion cub.

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A SEED IS WONDERFUL

By UNCLE DICK

IF WE all had the courage of a seed we could be very happy. It takes courage to fall upon a bit of dirt that has gathered in the cleft of a rock and then to grow. Even after the little coat of the seed has burst and the tiny little tree starts reaching up into the sunlight, it takes courage to keep growing. The roots of the tree must fight their way into the cracks in the rock. Slowly, as the months and years go by, these roots must try their strength against that of the great boulder. They must push against the sides of the great rock and ever so slowly make room for themselves. They must greedily suck up every bit of moisture that seeps down to them. They must draw every bit of strength they can from the scanty soil that has gathered in their rocky bed. But seeds will take root and roots will grow even in such places as did this tree. Yet when we see it we must take off our caps to the courage of both seed and tree, and hope we will have as much courage as this seed and tree when it had to fight against such odds.

THIS TREE GROWS NEAR ALIQUIPPA, PA., WHERE R. M. HUSSEY SNAPPED IT

MORE NAMES FROM LATIN AND GREEK

Again we present analyses of scientific names of two things described in this issue of Nature Magazine. The analyses are prepared by members of the Latin Junior Scientists' Club of the Abraham Lincoln High School in Brooklyn, New York. The research was done by members of the Club as well as those whose names are signed to the analyses. This month the subjects are the Pacific Rattlesnake (Page 229) and the Snow-on-the-mountain (Page 231).

SNOW-ON-THE-MOUNTAIN—*Euphorbia marginata.* Snow-on-the-mountain is a poetic name for a plant so beautiful that you think it the prettiest one on earth, as you have thought about almost every other; but its scientific name is even more fascinating.

Marginata is easily explained because of its white-margined leaves surrounding insignificant flowers. Like its relative the poinsettia, which we see at Christmas, with its showy, scarlet, flower-like leaves, the real blossoms are inconspicuous.

Euphorbia, however, and Euphorbiaceae, the name for the whole Spurge family, date back to the time of Julius Caesar and Juba II, a king in Northern Africa. Juba I had fought with Pompey against Caesar, and his son was well educated at Rome. Later he wrote many books on many subjects, one of them *De Euphorbia herba.* Juba had discovered the herb on Mount Atlas, so a Roman writer Pliny tells us, and found it useful as a medicine for some purposes. The name of his physician Euphorbus means "well-fed" in Greek, so perhaps King Juba said, "Since the plant looks well-fed, with its thick stalk and milky juice, and since it heals the sick, we'd better call it *Euphorbia.* (Perhaps Euphorbus was fat, too.) Apparently Linnaeus, who chose the name in 1753, knew the story of Juba and his doctor, for while all our zoological and botanical names start from Linnaeus, he used of course many names of earlier authors.

The Greek word *eu,* meaning well, is common in English—in such words as *eugenic,* well-born, and *eupepsia,* good digestion.

So the Snow-on-the-mountain is a good plant to choose for your dining-room table, not only for its beautiful white-margined leaves, but because it means well-fed.

LILLIAN SCHWARTZ
MURIEL DRUCKER.

PACIFIC RATTLESNAKE, *Crotalus confluentus oreganus,* is as interesting a species as there can be. If you ever come in contact with one of these snakes, leave the vicinity in great haste, for it is poisonous, but do not be frightened at the name.

Crotalus is from the Greek *crotalon,* a rattle; when the snake sheds its skin, the tip of the tail is pushed out by the new skin, so as to form, year after year, horny, interlocking joints. When the snake is alarmed, the tail is vibrated rapidly, and these loosely fitting shells produce a shrill or sharp rattling sound.

The true meaning of *confluentus* is seen from the Latin prefix *con,* meaning together, and *fluo,* to flow. Latin students know the root in *flumen,* the word for river, and we all recognize it in the English word fluid. There are spots on the back of the rattlesnake's neck that flow or run together into a longitudinal mark, as may be seen from its pictures.

The genus is *Crotalus,* and there are fifteen well-defined North American species. Earlier authorities differed about the classification of the Prairie rattlesnakes; but hundreds of specimens have been studied recently, and Dr. Ditmars, the well-known curator of reptiles at the New York Zoological Park, explains, in a book published in 1931, that both are forms of *Crotalus confluentus.* The Pacific rattler, *Crotalus confluentus oreganus,* is a western race of the Prairie species, *Crotalus confluentus confluentus.* The Pacific rattler is distinguished from the other by its darker markings, with the edges of the blotches of color fusing into the longitudinal mark.

Words allied with the generic name *crotalus* also embody the idea of the rattle. *Crotalaria,* for instance, or rattlewort, is a genus of plants of the pulse family, containing several hundred species. These are natives of warm countries, and many are cultivated here in hothouses; but one species is common in the eastern United States. It is called the rattlebox, because the seeds in the inflated pods rattle when they are ripe, if the pod is shaken.

Crotalum is the name of a rattle or clapper made of bone or wood, once used in Greece and Egypt. There is also a Turkish musical instrument, like a cymbal, known as the crotalo.

ETHEL FINK
LILLIAN SCHWARTZ
ARTHUR HUNAU
HARRIET RAMIENSKI.

A Hardy Fig

"Last spring when our fig tree did not leaf out, we discovered that during the winter every branch had frozen," writes Miss Ree Gash of Belmar, N. J. "The beginning of June we cut the tree back to the ground, painted the cut ends and hopefully watched for signs of new life. In July the little leaves began to show and grow rapidly. During August the shoots made their most rapid and vigorous growth, with figs setting on in abundance. Toward the end of September the tree was eight feet tall, loaded with figs and still growing. This last winter it had good protection."

Forest Purchases

Lands within National Forest areas totaling 154,420 acres have been approved for Federal purchase by the National Forest Reservation Commission. The tracts lie within National Forests and purchase units east of the Great Plains, about one-third in the Lake States, one-third in the Appalachian region, and most of the remainder in the Ozark and Central Mississippi, and the Southern Pine regions. Small acreages in New England were also approved. The average price per acre for all purchases was $2.97.

About Labrador

If there are two names which are synonymous they are Labrador and Sir Wilfred Grenfell. And when the latter writes a book about the former—as he has done in *The Romance of Labrador*—we know that here is a volume written with authority and with the enthusiasm of a man who has devoted his life to a people and a region. This is not, of course, the first book that Sir Wilfred has given us about this northern land, and, we trust, it is not the last. In this volume, however, he writes of the history of Labrador, setting it against a background of a rugged and beautiful country. In this book he treats considerably with the flora and fauna as an integral part of that history. It is a fascinating volume, both for its contents and for the charming style of its author. The publishers are the Macmillan Company, and the book sells for four dollars.

Concerning Daylilies

Daylilies is the simple and adequate title which Dr. A. B. Stout of the New York Botanical Garden has given to the volume based upon his study of the various species which make up the genus *Hemerocallis.* Drawing upon the large collection available at the Garden and upon facts obtained from experts in England and Italy, the author presents valuable information both upon the species themselves and their uses and culture. It is a valuable and intensely interesting book for the specialist in horticulture. There are several color plates by Mary E. Eaton and numerous halftone illustrations. The publishers are Macmillan, and the book sells for three dollars.

About Orioles

Human traits were detected by Lola A. St. John of Albany, Indiana, in a pair of Baltimore orioles building a nest. At first all went well. One bird would work on the nest while the other gathered materials. Finally Mrs. Oriole returned from a foraging trip to find her spouse busily working. What he was doing apparently did not appeal to her esthetic sense. She chattered and fussed until he was goaded into what seemed to be exasperated tolerance. He calmly perched below the nest and cocked his head at it as though approving his own handiwork. At the same time he seemed to indicate that if she did not like the way he did it she could do it herself. This she did, tearing down what he had done and building it over to her own liking. He ignored her independently for quite a time before he would give in and go to fetch some more building material.

A Robin Guest

Among the many bird guests of the Layton family in Burlington, Iowa, is a robin who has been christened "Bobbin." He arrives always before the last snows are over and makes himself at home. He usually feels that he is lord of the feed box, but one day was bluffed by a blackbird at the bird bath. This fellow was soaking a piece of bread to get it ready for his offspring. Bobbin resented this and set up a cry of distress. He scolded so that the family finally scared the blackbird off. After that Bobbin sounded his distress cry frequently, knowing that it brought results. He is most friendly, and when the garden is about to be watered will follow around until the hose is turned on so that he can bathe in the spray.

A Novel Sentence

There is much judicial wisdom in the sentence passed by Justice of the Peace A. B. Wilson of Contra Costa County, California, following the conviction of a Japanese for killing robins. Judge Wilson said: "It is the sentence of the court that you approach every Japanese in the valley, informing him that it is against the law to kill robins, cottontail rabbits and meadow larks and quail out of season, and you must have each one you approach sign a statement that you have talked to him. Then you must submit the list to me. If, in the future, any valley Japanese is brought into this court for violation of game laws you will be fined if his name does not appear on the list." This sentence might well be adapted to other localities in taking care of game law violators.

Mesa Verde Museum

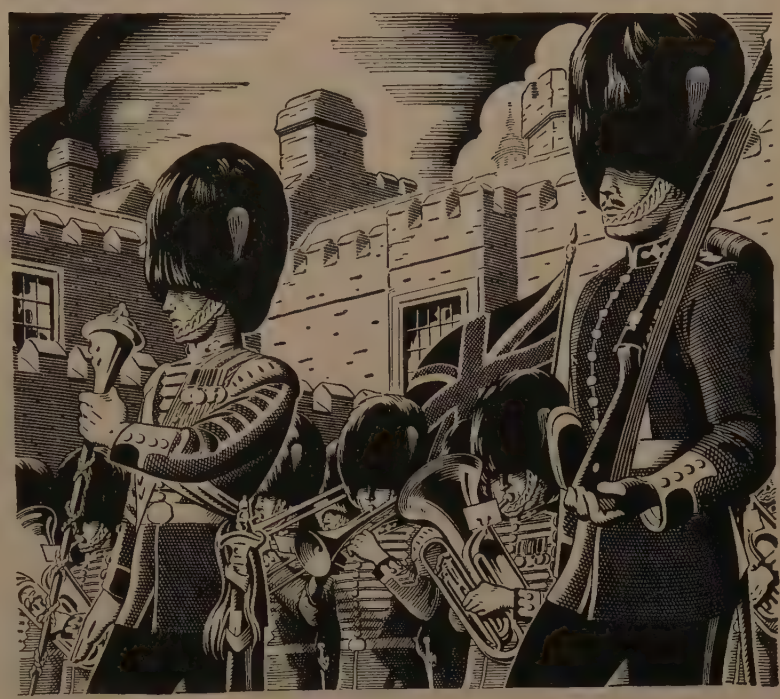
Everyone interested in archeology and all who have been fortunate enough to visit Mesa Verde National Park will be happy to learn that an allotment of $25,000 from public works funds has made possible an addition to the park museum. Already overcrowded with fascinating relics of ancient Indian days, it will be possible now to give more adequate display.

Against Falconry

There are many fanciers of homing pigeons in Great Britain. Many of them are working men who train and fly these birds. At the same time there has been a revival of falconry in Britain, with the result that many of the hawks now used in this sport have captured and killed homing pigeons. The pigeon fanciers are now going to Parliament with a bill to make falconry illegal.

Bird House Plans

W. H. Hoffstot of 14 East 55th Street Terrace, Kansas City, Missouri, is a bird lover. He feels strongly that more consideration should be given to the problems of house nesting birds in urban areas. So he offers to send free to anyone who will send a stamped, self-addressed envelope, simple plans for the construction of a bluebird house.



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NATURE IN PRINT

About Our Forests

The People's Forests, by Robert Marshall, the latest book dealing with our forest problem, has been praised and condemned in rich superlatives. Reviewers deal with it only at the top of their voices, and invariably praise or condemn it from the vantage point of their own sociological background. Very few have yet made an effort to review this forestry book from the standpoint of forestry.

And yet from the standpoint of forestry it deals with the most tragic aspect of conservation history—our failure to safeguard the nation's timberlands. More, it has the courage to advance a proposed solution. Probably everyone will heartily agree with the powerful picture Marshall paints of the early forests and the processes by which they have been progressively devastated. Everyone, too, will agree that this devastation is worth stopping. But with the question, "How can this best be done?" many come to the parting of the ways. Briefly, Marshall's thesis is that since private ownership has failed to preserve the public values of the forest, that since precedent, both domestic and European, gives us little to hope for from methods of public regulation, there remains no other effective way of protecting our forest resources than by returning them—through purchase—to public hands.

Each reader, in the light of his own experiences and mental trends, will decide for himself whether this is the desired solution to the problem or not. This reviewer is far from sure. While refusing to shut the door to the possibility of wholesale acquisition being the ultimate solution, he would like to see further explored the possibilities of Federal regulation, and he evidently is more favorably impressed with the results of some European methods than is Mr. Marshall.

But far more important than these questions of opinion, the unassailable fact stands out that here is a forester who is thinking about forest problems along broad, national terms. Here is one who not only has a background from which to write and the courage with which to write, but an ability to present a case strongly and intelligently. That is what makes *The People's Forests* a significant book. It is published by Harrison Smith and Robert Haas, New York, at two dollars. T. G.

Conquering a Continent

Madison Grant is concerned with people and with races. He has studied them, analyzed them and arrived at definite conclusions. These are found and developed in *The Conquest of a Continent.* This is what might well be described as a racial history of America, perhaps the only one with right to claim this title. We are accustomed to think of ourselves as a race although a moment's thought would show us to be careless at reaching any such sweeping conclusion. No better phrase to describe us has been coined than "the melting pot." And it is with this melting pot that Mr. Grant is concerned. In his book he has traced the process and effects of racial origins in the conquering of this continent. He has drawn interesting conclusions to show the manner in which our political, social and economic development has been affected by these strains of race. Space does not permit citation of any of these, but the reader will find in this volume some provocative material and much fascinating reading. The publishers are Scribners and the book lists at three dollars.

Bumblebees

Even though the majority of people may duck apprehensively or freeze in rigid anticipation of a sting when a bee buzzes about, there are few more fascinating members of the insect world than the bumblebees. They have long been a particular source of fascination to Dr. Otto Emil Plath, professor of biology at Boston University, and he has devoted many years to intensive study of the habits of the true bumblebees and the parasitic species. The results of these studies are embodied in a most interesting volume entitled *Bumblebees and Their Ways.* In telling the story of his researches and discoveries the author has adopted an interesting style which makes his work of broad interest to the layman and Nature lover as well as to the systematic scientist. Dr. William Morton Wheeler, professor of entomology at Harvard, supplies a foreword. The book is published by The Macmillan Company and sells for four dollars.

Southern Birds

Charlotte Hilton Green, North Carolina bird lover, is the author of the latest bird book to come to our desk. It bears the title *Birds of the South* and deals with the permanent and winter birds of the southeastern states. The author has studied and observed birds not only to learn their habits of life but to know and to love them. She has found personalities and individualisms in her bird friends and in her writings this is combined with factual material to make her book interesting as well as informative. The book is illustrated with line drawings and several color plates. It is published by the University of North Carolina Press at Chapel Hill and sells for $1.50.

Useful Wild Plants

In the field of botanical writing, Charles Francis Saunders enjoys a wide following. This has been achieved both as a result of his knowledge of his field and a marked felicity of style in telling about it. Now, in *Useful Wild Plants of the United States and Canada,* he gives us some fascinating material on wildlings which serve important medicinal and economic purposes. There are some surprising facts in its pages, and this new and entirely revised edition has provided an opportunity to record many new ones. The book is published by Robert M. McBride and Company and sells for three dollars.

Some Animal Stories

Margery Bianco has added another to her list of animal stories for young people and has given this latest volume the title *More About Animals.* This is a group of first person stories of observation by one who has an affectionate, quick and understanding eye for what goes on in the minds of those who cannot talk to us. Here she treats both with dogs and cats and with several wild animal friends. The publishers are the Macmillan Company and the book sells for $1.75.

Aids to Botany

A little book entitled *Aids to Botany* by H. J. Bonham comes to us for review from William Wood and Company, Baltimore. It appears to be a condensed botany textbook designed to assist the student of Botany in passing his examinations. The book sells for one dollar.

Hunting Bird Songs

When we published the article entitled "The Song Hunters" in the April issue of NATURE MAGAZINE we did not know that Mr. Brand was bringing out a book about his experiences and experiments. Now a most interesting volume entitled *Songs of Wild Birds,* written by Albert R. Brand, comes to us and we find that it is a most interesting further report on his unique work. He tells us in detail about the recording of bird songs, and the how and why of bird music. The balance of the volume is devoted to a description of thirty-five different birds whose utterances, musical or otherwise, Mr. Brand has recorded. Finally, in a pocket in the back of the book, are two, two-sided phonograph discs upon which these songs are recorded and which may be played on your phonograph. If this is not two dollars' worth for any bird lover, the publishers, Thomas Nelson and Sons, have guessed wrong. We are sure that they have guessed right and that this book will find the popular acceptance that it deserves.

Nature Pictures

There is a constant demand for good, large, separate pictures for school Nature work and this demand has been only fragmentarily satisfied. Now comes to our attention what is apparently a start at solving this problem. This consists of a group of forty-eight pictures, nine and one-half by seven and one-half inches in size, from the photographic negatives of Gayle Pickwell, editor of *Nature Study Illustrated* and *Western Nature Study.* Some of the pictures have been published in NATURE MAGAZINE. This is the first unit in a series of planned pictorial displays. The set of pictures is accompanied by a booklet in which a brief description of the subject is combined with Nature study suggestions, the combination making a valuable item for the schoolroom. The pictures have been chosen carefully to show, in practically every instance, an animal doing something characteristic and significant. This project is being brought out by Publishers Distributing Service, Los Angeles, California.

A TRIBUTE TO UNCLE SAM

By MILDRED JOHNSON

That the choice of a mail box as a home site by a pair of bluebirds should interfere with Uncle Sam's postal service is, to my mind, worthy of a chorus of praise from Nature lovers. Routine is routine; but it is heartening to know that there is a little humaneness mixed with it.

About two blocks from where I live, at the end of a lane, stands this mail box that became the shelter for the bluebirds and their family. There are many houses on the street, because it is in a suburb of a large city; but this home sanctuary was highly respected by the neighborhood. The postman saw to it that no mail intended for that box interfered with the home life of the bluebirds. On one occasion the owners of the mail box thoughtlessly placed two letters in the box, to be collected by the postman. A few minutes later, someone spied one of the bluebirds flying across the street with *both* letters. It was quite a feat for his strength, and he dropped them when halfway across. After that, great care was taken to offer no more offense to this new family that had moved into the neighborhood.

BUMBLEBEE IN WINTER

By DAVID W. RIAL

An experience my brothers and I once had which may be of interest to Nature readers occurred one winter when we helped "to work out" a portion of our county road tax. The stones for the road repair were usually hauled after seeding time in the fall. This particular fall had been such a busy one that when the holidays came around the stones for the rebuilding of the road were not in place. An early winter had frozen the ground as hard as flint; we could not go to the fields and gather up the stones scattered over them as was our custom. We had, however, a woodlot, which for stoniness had no equal on the whole farm. Oak and chestnut leaves covered the ground a foot deep, and though the open ground was frozen a foot or more, underneath the leaves of the woodlot the soil was soft as a May garden.

To get the necessary stone we drove to the woodlot, scraped away the leafy covering, and soon grubbed out a wagonload of stone. Upon one of these trips as we raked back the leaves, we found a queen bumblebee.

As the reader doubtless knows, the queen bumblebee is the only member of the colony to survive the winter. Here was an answer to the question we had so often asked, an answer—like many important scientific discoveries—chanced upon wholly by accident.

Thank Goodness

We are happy to record that the National Park Service has had its name restored. When it became officially the Office of National Parks, Buildings and Reservations we groaned at the ruling that would so name a government function which comes into such close contact with so many of the people and which has been known so long as the National Park Service. The Interior Department appropriations act for 1935 contained a provision dropping the multiple-word name. Thank goodness.

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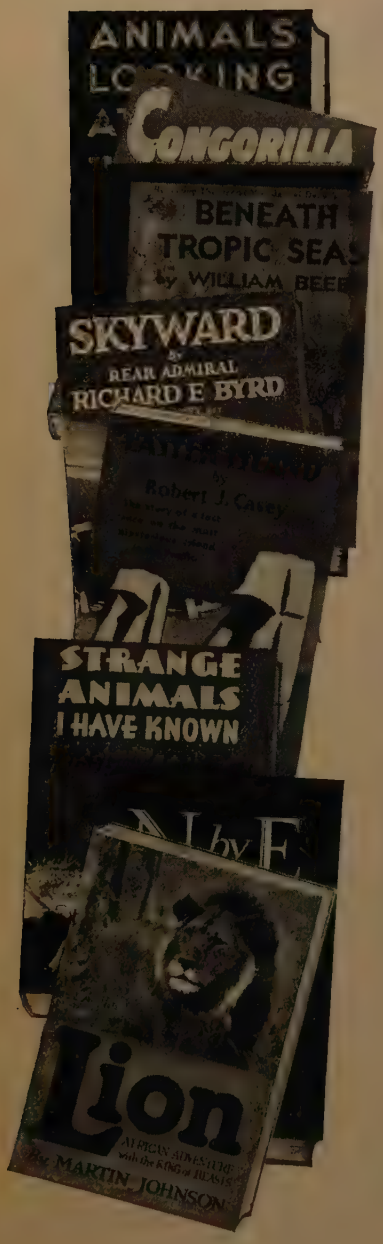

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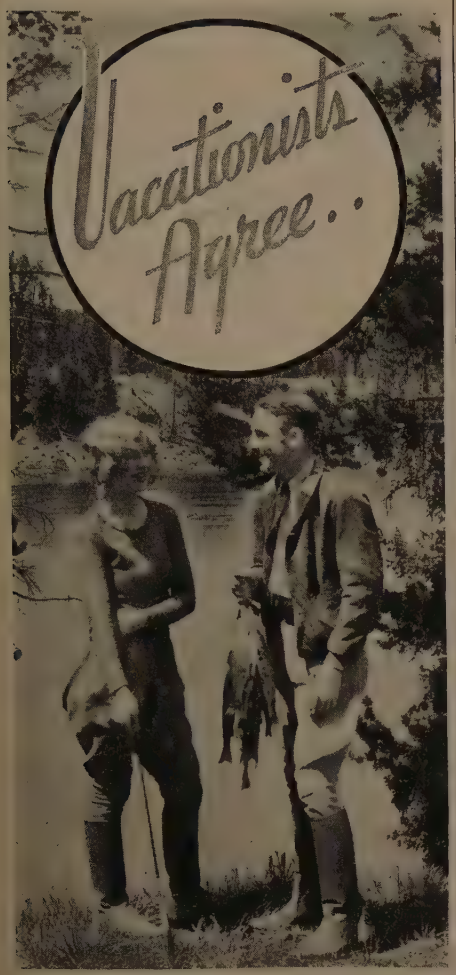

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BALD EAGLES IN KANSAS

By RALPH H. IMLER

There are few people who know the bald eagle from seeing it in its native wild habitat; fewer still are those who have had the opportunity to study them in a region of the United States where they are common, for such places are rare. Yet in western Kansas, which is often thought of as only barren prairies, such a region is to be found.

Along the south branch of the Solomon River in Rooks County there are many large elm and cottonwood trees. Many of the cottonwood trees reach a diameter of three to four feet and a height of seventy to eighty feet. There is one noted cottonwood two miles west of Stockton, Kansas, which is ten feet in diameter and its three main branches, at a height of twenty feet, are over three feet through. Each branch is equal to a large tree.

These trees and the broad shallow stream which wanders among them seem to appeal to the bald eagle as a winter home. The most remarkable roost is seven miles southwest of Stockton in a grove of cottonwoods. The oldest residents in the community will tell you that the eagles have been roosting here each winter since the country was settled. They arrive with the first severe winter storms in November and December and leave in March. The writer has counted 23 bald eagles in this roost at one time.

During the day the eagles hunt in the bluffs and ravines which border the streams, and on the upland prairies of the surrounding country. They may wander ten to fifteen or more miles from the nearest roost. Most of their hunting ground is rough and covered with native bluestem. Rabbits, which are the principal item in the diet of the eagles, are abundant. These eagles rarely, if ever, eat any fish here in their winter home.

Early in January a full grown bald eagle in the immature plumage was found injured. It is now kept in a large pen and seems to be completely recovered. It eats two jackrabbits a week and has grown so tame that it will take meat from the hand. It seems to like having its back stroked but it resents anyone touching its wings. This specimen has a seven-foot wing spread and is thirty-seven inches long. It is hoped that it will soon be able to fly and take care of itself.

PASQUE FLOWERS IN WINTER

By HELEN VAN WINKLE

This past winter in Montana has been the cause of many queer happenings. Usually by the end of November the ground is covered with snow while the thermometer registers below freezing. This year there has been no snow and the weather has been so warm that many of the botany classes at Montana State College have been taking field trips. On one of these trips during the latter part of November several groups of the pasque flowers, or spring crocus, were found blooming on the windswept tops of foothills. These flowers were small and stunted but were actually in bloom at the end of November instead of in April when they should bloom.

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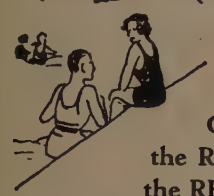

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THE GRAY SQUIRREL MIGRATION

(Continued from page 222)

for the season of the year. They were active at all hours of the day and many were found dead along the highways, apparently killed by motorists, which seemed to indicate that they travelled by night. Thirty gray squirrels were found dead along the west shore of Candlewood Lake, Connecticut, near the New York border and were apparently drowned, which is strange when one considers that the Housatonic is a swift river, 200 feet wide, yet the gray squirrels reached the opposite shore with little effort, not even pausing on the farther side before continuing their trek.

The main body of the gray squirrels reached the Hudson about December 10th, when hundreds were reported crossing Bear Mountain Bridge, and during the next few days civil conservation workers near Highland Falls, N. Y. told of seeing hundreds swimming the Hudson. A dozen individuals boarded a ferry, which crossed the Hudson River between Yonkers and Alpine, for the 6:00 A. M. trip and scampered ashore as soon as the boat docked.

Roughly speaking, two months elapsed between the time the squirrels crossed the Connecticut River and the time they arrived at the Hudson. The numbers observed apparently had not noticeably increased.

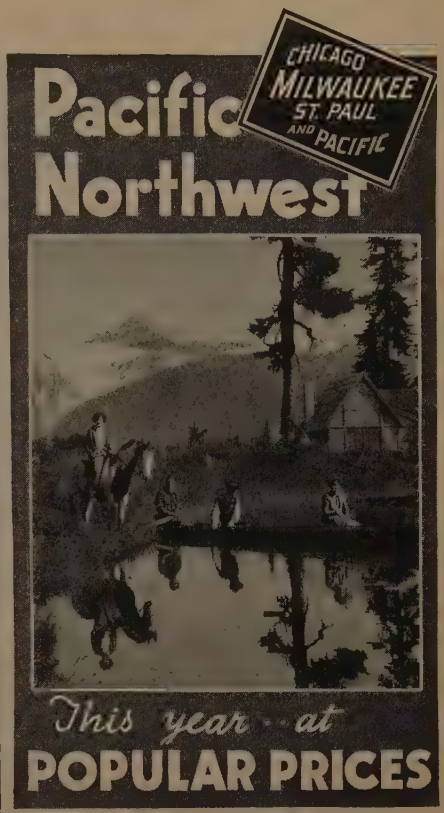
Once in New Jersey, they seem to have disappeared. Had they followed westerly in a direct line, we should soon have news of them crossing the Susquehanna or the Delaware.

Judging from the number of large rivers crossed during the migration, gray squirrels are strong swimmers. When entering the water, according to most eye-witnesses, they swam with their tails in the air, suspended high out of the water. In a long swim or in rough water they gradually relaxed and the tails slowly drooped until submerged.

A general census of available data on the cause of the present migration indicates that lack of suitable food in some places correlated with a fairly large squirrel population started the migration. Neighboring districts with a sufficient supply of food to support their own squirrel population were not able to stand the added burden of greatly increased numbers, and the intruders were either driven out or, more likely, all were forced to join the advancing army when the food supply was exhausted. Once a stampede was started, it would not be long before the recruits numbered several thousands, and of necessity the rate of travel would be accelerated. Fatalities due to various causes might at first be rapidly replaced, though exhaustion through continuous travel and lack of food would eventually be the major factor in terminating the migration.

In February, 1929, a similar but smaller migration of gray squirrels appears to have been in progress near Stamford, Connecticut, though it received little attention at the time. According to local reports, lack of food was the chief cause. Estimated numbers unfortunately were not recorded, but the account stated many were drowned when attempting to swim the lakes and rivers.

Another gray squirrel migration that passed without much comment was in the fall of 1931. The Susquehanna River fishermen told of having squirrels board their boats in mid-stream and remain until dry and hop off again and continue to the New York shore.



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According to State Conservation Inspector C. W. Sandway, the squirrels crossed from Pennsylvania and penetrated into the southern tier of counties, particularly Broome, Delaware and Tioga, working north into Chenango.

Seeking for causes which govern the extreme fluctuations of animal populations in a given area has long been a field for wide speculation. So far scientists have found no satisfactory solution. Aside from its aesthetic value, an explanation would be of great economic importance. Mr. Anthony points out that "The departure of the cod from the Labrador banks where they habitually congregate, seriously disturbs the welfare of the people who largely depend on these fish for a living." Last year the varying hare was near the top of one of its periods of abundance in eastern Canada, which fact might be used by some to demonstrate that the increase in numbers of hares and in gray squirrels was due to a common factor. Mr. Anthony gives us some very interesting facts concerning the relationship that exists between the periods of sun-spots and the plant growth as recorded in the annual rings of trees and the spectacular fluctuations of animal abundance. This, he believes, may be a coincidence, but there can be little doubt that the variation in solar energy has its effect on climate, which, in turn, reacts on plant life. A change in such vital characters of environment as climate and vegetation must influence the animal life of a given area.

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For the third straight year instruction will be given to students of Duluth, Minnesota's, Central High School in the fine art of fly casting. It is an extra-curricular activity, a part of the physical education program, and eighty-five boys were enrolled in the class last year. Classes meet twice a week. If you don't believe it's a fine art, try it.

To a Contemporary

Marjorie Chase and Alice Eaton live in Northville, Michigan. They are both thirteen and Nature lovers. They are also editors, because for more than a year they have been issuing *Nature News*, thus keeping a growing list of subscribers abreast of what is going on in the local Nature world. They are no swivel chair editors, either. Their material is gathered on hikes in the open where four bright editorial eyes find a vast amount of information worth passing on. May their circulation grow.

Poetry Award

Announcement has been made by the Chattanooga Writers' Club that the first prize in the annual Elberta Clark Walker Memorial Nature Poetry contest has been awarded to Edith Mirick, Washington, D. C., for her poem, "Old Pastures." Second prize went to Olive Woolley Burt of Murray, Utah, for her poem, "Calendar." Three hundred and eighty-two poems from forty-four states and Canada were received. Professor David Morton of Amherst College, Amherst, Massachusetts, was the judge for 1933.

Going by Automobile?

It is not so long ago that an automobile trip of even modest distance was a courageous act of pioneering. Today the surface of our highways is almost uniformly smoothed, and the path has been even further eased by the rather amazing free service to motor travellers rendered by one of the large oil companies. It is possible now, for a three-cent stamp, to have one's trip routed, to receive descriptive literature about the things to see and places to stop en route, to arrange for special services on the way or to receive special information and advice on the trip. Last year 196,418 motor travellers availed themselves of this free service. If there are readers of NATURE MAGAZINE planning an automobile trip this year, and if they will write to us indicating their starting point, their destination, their special interests and any other details relative to their trip, we will be only too glad to see that this free service is extended to them.

Fox and Woodchuck

When a boy on his father's farm, John G. Herrick of Hillsboro, New Hampshire, had an amusing wild life encounter. He was heading for the cornfield with the thought of bringing down a crow when a young fox emerged from hiding. Having no wish to shoot the fox, young Mr. Herrick set out after it on foot. Reynard apparently did not know he could outrun the boy, so dashed into a woodchuck hole. While the breathless boy was studying how to cover the hole and get a shovel to dig out the fox and make a pet of it, there was a commotion and out came the fox with the woodchuck after it. The boy set out after the two, but the woodchuck quit soon and sat up on his hind legs. Mr. Herrick says that he was sure there was a smile on the 'chuck's face as he continued the fruitless chase.

For Nature Study

Declaring that "a true understanding of Nature and natural phenomena enables man to overcome his superstitions, his prejudices, his needless fears and desires to destroy; that there is definite need for conserving our forests, our wild flowers, our birds and some of our animals; that natural resources and the intelligent use of them, are the foundation of our economic and social well-being," the Palm Beach County, Florida, Federation of Women's Clubs went on record in favor of Nature study in the schools. The resolution urged "that the public schools make Nature study a fundamental elementary requirement for promotion from grade to grade; that high schools include a course in the use of and importance of natural resources."

Trumpeter Gains

Fifteen years ago the trumpeter swan seemed doomed to extinction and generally today it is a rare bird. However, under protection, the bird is rapidly reestablishing itself in Yellowstone National Park. During the early months of the year considerable flocks of this swan were seen near Yellowstone Lake.

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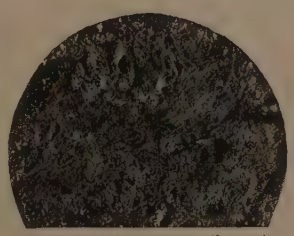

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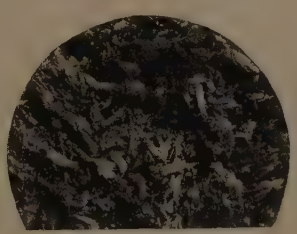


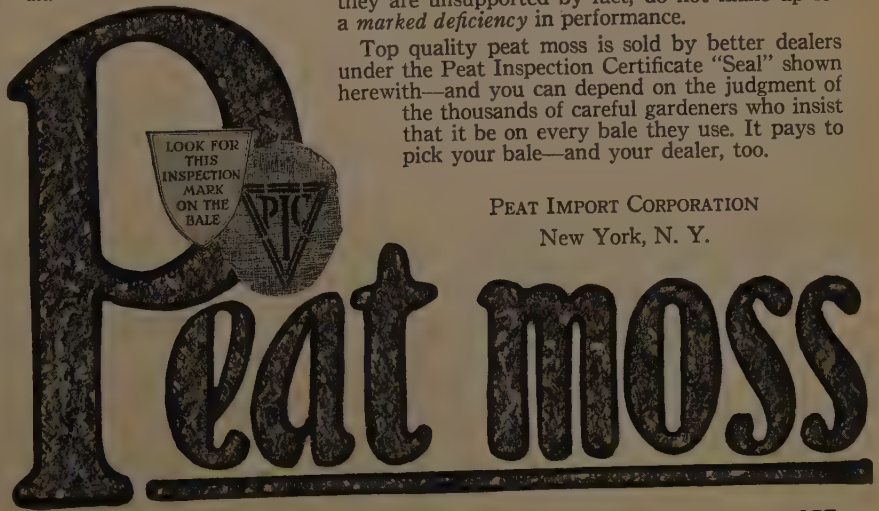
Microscope's eye evidence of poor quality peat moss. Coarse, brittle-stemmed, straw-like in structure. Can this be effective? And the answer is, that it definitely can not.

We are frequently asked this question because the market is being flooded with cheap-grade peats of doubtful value. In commenting on the situation in bulletin #167, the U. S. Dept. of Agriculture says the use of peat moss was built up in past years by the "uniformly high quality of material". *"Lately,"* it continues, *"large quantities of lower grade and moist peat moss are being sold in our markets."*

It is difficult to distinguish between grades because they all look alike. But the similarity is entirely external. Peat moss of good quality must have a high water-absorbing capacity; a moderately high cellulose content; little ash and little or no fibre. Good peat moss should not be too dry either, or it will lose its water absorbing capacity and be unfit for garden use. P I C brands excel all other brands in these important features. In fact gardeners are beginning to realize that our claim of high quality is not over emphasized.

If you flirt with cut-rate brands, sooner or later you will find that all peat moss is not alike even tho it comes in burlap bales. Matching the package doesn't match the quality. Copying trade marks, making claims of "just as good" or "better" when they are unsupported by fact, do not make up for a *marked deficiency* in performance.

Top quality peat moss is sold by better dealers under the Peat Inspection Certificate "Seal" shown herewith—and you can depend on the judgment of the thousands of careful gardeners who insist that it be on every bale they use. It pays to pick your bale—and your dealer, too.



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Garden Annual

Again to delight the gardener comes the Studio Gardening Annual brought out by the Studio Publications under the rather unimaginative title of *Gardens and Gardening*. This is the 1934 edition of the volume showing trends of gardens here and there about the world, principally in picture. Without referring to the 1933 volume, we should say that there is rather more text this year than last. The pictures are beautiful and splendidly printed. There is a frontispiece in color, a reproduction of a painting by Stanhope A. Forbes of an Italian Garden in Cornwall, England. This book should be suggestive to gardeners, particularly those with considerable grounds. It sells for $3.50 in paper binding and $4.50 in cloth binding.

Ready-made Garden

What won't they think of next? Now we have a garden that is ready-made like a suit of clothes. It can be purchased in three sizes—ten feet by 18, 24 or 36 inches, all provided with seed planting plans, the seeds and soil invigorator. The garden consists of a piece of what is called mulch paper which has on its face the planned garden with holes through which the seeds are planted. This is anchored over the prepared garden plot, and, as the season progresses, raises the temperature of the soil, conserves moisture and eliminates the labor of weeding. It's called the "Come-Pakt Planned Garden." It looks clever.

An Egg Incident

One summer morning, writes Etta M. Morse of Woonsocket, South Dakota, two mourning dove eggs were brought her by some neighbor children. They had found them on the ground but could discover no nest. Miss Morse put them in a box of flower seed on a shelf. The week was hot, but three days after the eggs had been set aside there came a change in weather. Miss Morse went out to do some gardening, taking the box with her. She was called away and when she returned there was one baby mourning dove, chilled but still alive. It proved impossible to warm it enough with one's hands and some warm milk did no good. The baby bird died, but ever since Miss Morse has been wondering whether she could have raised the bird if it had not been so chilled.

Canyon Deer

On several occasions during the last month, says *Grand Canyon Nature Notes*, some of the C.C.C. boys stationed in the bottom of the Canyon, near Phantom Ranch, have reported being eye-witnesses to deer swimming the Colorado River. On one of these occasions they were surprised at the manner by which a doe and her two fawns estimated the flow of the stream so that with the speed of the current and their swimming they were able to land on the opposite side at the only possible place from which they could have climbed out of the water. This is just another proof that deer, at least, do not find the Canyon an impassable barrier between the rims.

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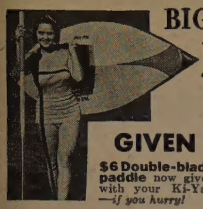

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The Super Dux Company, 2208 12th St., Detroit, Mich.

THE FIGHTING SALMO

(Continued from page 225)

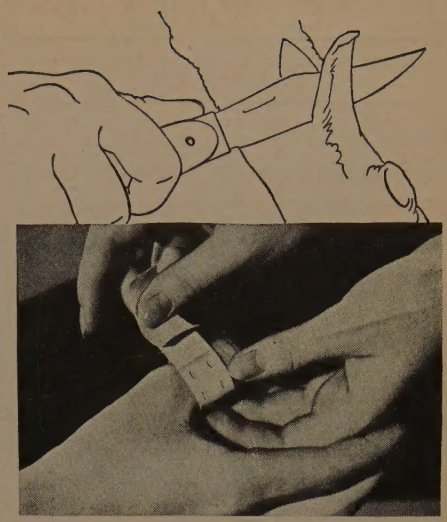
the tail in the opposite direction until a fish appears; a fish with a tiny sac attached to it. This sac supplies food for the fish by absorption until he can be fed bits of finely-ground fresh meat.

Baby trout now are kept in nurse ponds until they are in the fingerling stage before they are turned into streams. They are better able to take care of themselves at that size than when smaller. Beaver ponds make ideal planting spots for these young fish. The broad-tailed dam builders never molest trout because the beaver family is exclusively vegetarian.

Trout are cannibals. That is another reason for protecting the tiny fish until they are able to rustle for themselves. Beside the helpless young of his own species, the trout eats winged insects that fall into the water or those actually grabbed on the wing by swift leaping, larvae that he finds in the water and smaller water life such as fry of other species, minnows and the fresh water shrimp. It is largely temperature of the water and type of food that determine the color and firmness of trout flesh when cooked. Flesh color ranges from white to deep salmon. Trout served at restaurants sometimes are not so brightly colored in flesh, so finely flavored, so firm, as those taken out of high country streams. Commercial fish farms feed grains as well as fleshy foods to their trout "herds".

We know something concerning life habits of this fighting fellow of the rapids and swirling pools of the mountain streams. But I've sometimes wished it were possible to have a good long talk with a heady old trout; one of that kind that fishermen come back year after year to try to land. You still-fish for cats, suckers, carp and the like. But when you go after mountain trout you have to match wits against wits. They are canny, they know danger signals, they recognize man as a predator, and you must watch your step and keep a tight line if you are going to land Sir Salmo even after you hook him.

Just what a trout thinks about will probably always remain a mystery to the human species. But if you want to know what a fisherman thinks of a Rocky Mountain Trout, you just get the angler before a crackling log fire in some fishing lodge up in the Colorado Rockies, give him half a chance and then listen. He'll tell you that the trout of our western mountains is the brainiest, headiest, fightingest fish that travels American streams. If you don't believe him, he'll take you out the next day and prove it to you.



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In New Jersey

From April 9 to 13 Conservation Week was observed in New Jersey, with the schools actively cooperating in the programs. In connection with the observance a notably helpful and practical leaflet was brought out by the State Department of Public Instruction. The school days were allocated to one subject bearing upon conservation, and the leaflet outlines a program and provides bibliographical references for each day. Monday was given over to Outdoor Recreation and Conservation; Tuesday, Acquaintance with Plants and Animals; Wednesday, Enjoyment of Natural Beauty and of Places of Historic Interest; Thursday, Hunting and Fishing; Friday, Camping, Hiking and Picnicking. The leaflet contains much suggestive material and copies may be obtained from John A. Spargo, Department of Public Instruction, State Office Building, Trenton, New Jersey, for five cents a copy.

Spiked Mince Pie

A reader, who reports that she is dry by inheritance and habit, tells us of a bird experience of last Christmas. Always a bird lover and one who has fed the birds from the Sierras to New Hampshire, she discovered a new and somewhat demoralizing item of diet. Mince pie had been much in evidence at meals and even was brought to our correspondent on her lunch tray. Not caring for it but not wishing to send it back downstairs, she broke up a wedge of pie in small pieces and tossed it out on the porch roof. Later in the day she glanced out the window and was dismayed to find a score of birds teetering about, fighting, fussing and even staggering. They were undeniably tipsy, blotto or what you will. There had been a plentiful spike of rum in the mince pie.

Bird Refuge

An area of some 1,440 acres, nearly surrounding but excluding the Fort Mott Military Reservation in New Jersey, has been set aside by executive order of President Roosevelt as an inviolate bird sanctuary. This latest reservation will be officially known as the Killcohook Migratory Bird Refuge. It is established under the authority of the Migratory Bird Conservation Act of 1929 and through cooperation of the Department of Agriculture and the War Department.

How Nature Works

Robert Calvert of London, Ontario, reports an observation which shows the interesting interrelation of Nature's children. He was in Algonquin Park and came upon a group of birches into which yellow-bellied sapsuckers had drilled many holes. From these had exuded and congealed a sweet sap. Many hornets, bees and wasps had discovered this. A morning or two later he observed a pair of ruby-throated hummingbirds, a downy woodpecker, a sapsucker and a vireo in the vicinity. The latter was catching hornets for breakfast. Then a squirrel appeared, awaiting his chance at the nectar.

Interested in the Stars?

Broaden your scope of understanding beyond our own little world; reach out for information about the universe; it's interesting and only a little complicated.—The earth rushes through the solar system at an amazing speed. Every night we have new neighbors, some familiar friends, others, with a distant mysterious look, challenging identity.

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IN NEW YORK CITY

This idyllic scene might be a thousand miles from New York City. Actually it was photographed in Central Park, just a few steps from Essex House at 160 Central Park South.

Almost the only nature lovers who do not live near Central Park when they come to New York are those who cannot afford it. With today's rentals so moderate many more can now enjoy the birds, lakes, streams, trees, rocks, flowers, sunsets of this picturesque spot. For instance, you can engage a suite, furnished or unfurnished, consisting of living room, bed room, complete kitchenette, private bath at Essex House, including full hotel service, at rates that are surprisingly low even for today. Also regular hotel rooms for transient occupancy.

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Under Direction of Albert Auwaerter

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THE PASSION PLAY

Courtesy: German Tourist Info. Office, N. Y.

Oberammergau in the German Alps, famous for its Passion Play and artcrafts.

WHEN the loveliest month spreads its carpets of flowers over the valleys and mountain-sides of the Bavarian Alps in Southern Germany, the mighty spectacle of the Passion Play begins to draw hundreds of thousands from all parts of the world to the tiny mountain village of Oberammergau.

For 300 years the pious peasant folk have kept their vow, made during the great plague of the Thirty Years War, to re-enact every ten years the Passion of the Christ. In an atmosphere of sacred devotion and deep religious belief, the world's greatest dramatic performance takes place, amid scenic grandeur that forms an incomparable background.

Wherever your European trip takes you this year, May through September, Oberammergau must be the culmination of your travels.

Literature on the Passion Play will be sent to Nature Magazine readers on request to the Travel Bureau.

All information concerning steamship sailings, train connections, travel rates, will be supplied by the Travel Bureau of Nature Magazine, a service for the convenience of all readers. Literature on specific countries, sections, cruises and tours will be gladly sent and we suggest that you fill in the coupon below which is provided for your convenience. The following countries and territories may suggest a trip to interest you:

1. England	12. India	23. California
2. France	13. China	24. New England
3. Italy	14. Japan	25. Maine
4. Germany	15. Australia	26. Glacier Park
5. Switzerland	16. Africa	27. Yellowstone
6. Holland	17. West Indies	28. Grand Canyon
7. Sweden	18. Holy Land	29. Jasper Park
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